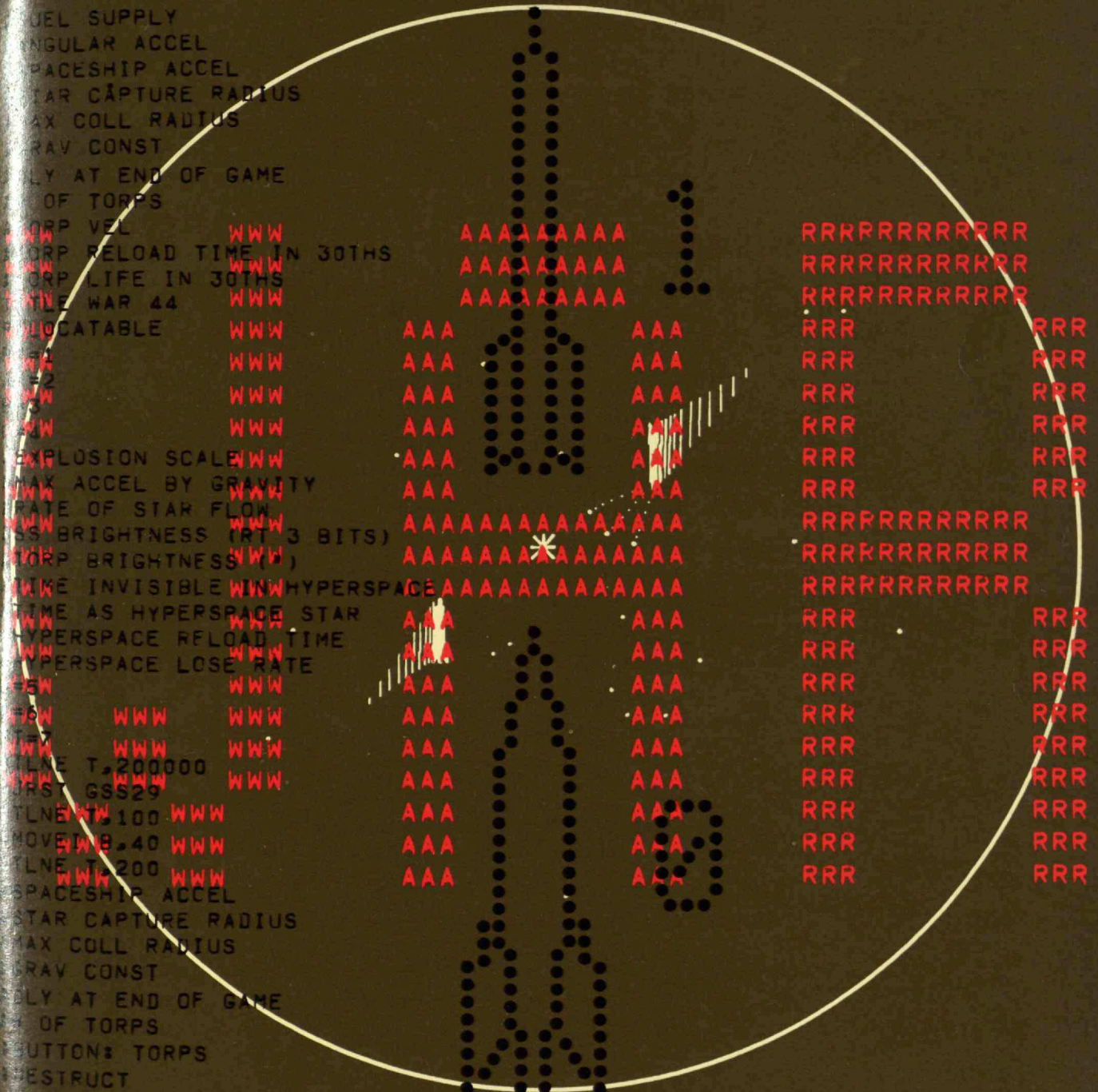


Technology Review

Edited at the Massachusetts Institute of Technology

June, 1967

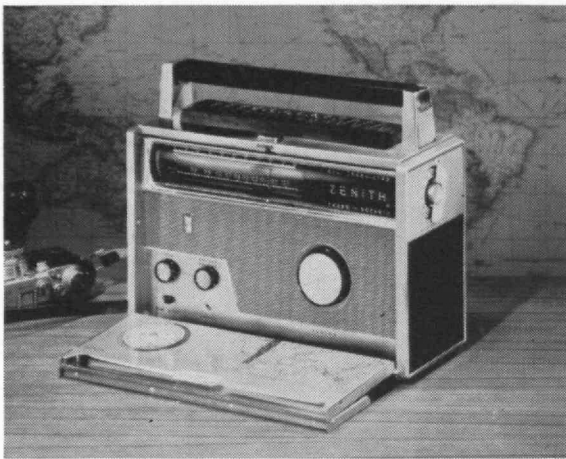


Space, Politics, and Peace

technology review

Published by MIT

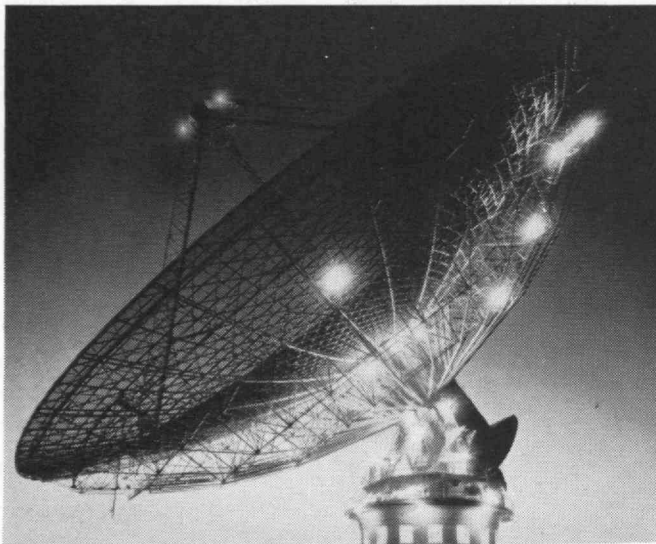
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Cover: Aspects of "space war," played on Project MAC's PDP-1 Computer. Although this is strictly in the realm of science fiction, computer simulation of war may be approaching the stage of science fact, as George Boehm points out in his article on page 14. Walter Clemens deals with the more hopeful side of the coin in his article on the space treaty, on page 18. Cover design by Barbara Hawley.

Next month: Articles on the geological riddles of the earth's only natural satellite, a new integration of the fine arts and technology, and what it's like to be an industrial manager in the U.S.S.R. Plus reports on traditional year-end festivities at the Institute—Commencement, Alumni reunions, and Alumni Day.

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Poets of Sea and Space

By Robert C. Cowen, '49

Harold Goodwin is right. We need poets in the sea. To extend his point, we could use them in space too. But, as associate director of the National Science Foundation's Office of Sea Grant Programs, the ocean is foremost in his thoughts.

Certainly we are the poorer for not knowing more of the inner experience of the men who are learning to live in alien worlds—the world of space and the world beneath the sea. For the first time in humanity's evolution, men are floating weightless, seeing their gravity-burdened earth from a new point of view. For the first time also, they are living for days and weeks within the sea, adapting to its pressure, working long hours in its water.

Not since some of the mammals turned back to the sea to become whales, seals, or dolphins has there been such a thrust into radically new environments. Never has the change come so quickly. Yet, except for the astronauts and aquanauts themselves, no one really knows what this is all about.

What is the impact on the mind and spirit? What happens to you as a person? There are mountains of official reports, psychological studies, and magazine features giving largely what amount to other people's assessments of what the pioneers feel. So far, there has been little direct communication of these things.

"Boy, what a ride!"

The astronauts are especially frustrating. There have been many press conferences where reporters tried to get behind the flight report and pull out this kind of poetry. There was L. Gordon Cooper, obviously elated with his first orbital flight. "What did it feel like, Gordo?" "Great!" he replied, and that substantially was that. Alan Shepard came closest to conveying his emotion with his exuberant "Boy, what a ride!" after the first suborbital Mercury flight. Then there was the astronaut who said that the most beautiful sight in orbit was a urine dump at sunset. Undoubtedly, the light flashing from the myriad particles was spectacular for him. But the imagery doesn't convey this to the rest of us.

Yet, while we are missing much of the most humanly meaningful experience of the astronauts, this may not be a critical loss. For an indefinite period, only handfuls of highly trained men

will enjoy space flight. The experience will remain alien to the vast majority of mankind for a long time.

Man in an Alien World

It is different with the sea. Scuba divers, of which there are many hundreds of thousands, and aquanauts, who live for extended periods under water, are opening a new realm of experience that will be widely available to others. Their inner adventures, their responses to the new environment, are of vital interest to those who would follow them. It is to them that we must look for impressions of the last great frontier on earth.

Mr. Goodwin had this in mind when he appealed for poets. He spoke as a member of a panel discussing "The Underwater Future" during the annual Underwater Clinic of the Boston Sea Rovers. It was held at M.I.T. last April. The Sea Rovers is a loose-knit group interested in diving and other underwater activities. Their clinic attracted many experts in this field.

These visitors told of the research submarines, now operating or planned, which are helping men explore the ocean depths. They explained the possibilities of men living for long periods within the sea. It was after a day of such talks that Mr. Goodwin called for the poets.

What's needed, he said, is for some of the divers and aquanauts to tell the rest of us what it means to a man or woman to adapt to this alien world. Debriefings and psychological reports won't do. Only the direct communication of inner experience—that is, poetic expression—will suffice. A few men are doing some of this communicating now, such as Jacques-Ives Cousteau. But results so far have been meager.

The need is great, Mr. Goodwin said, both to tell people generally about the new world and to help those who are planning to develop the underwater frontier better to assess its challenge. James Oswald, Staff Assistant to the Vice-president of the Underseas Division of the Westinghouse Electric Corporation, picked up the point. He noted that there is reason to suspect that thought processes may change under water, especially under the pressures several hundred feet down. The logic men use seems to be different from what they use at sea level, he said. He added that he very much would like to know how engineers would design equipment, indeed what equipment they would think of designing, when their thought processes are transformed in this way.

T. S. Eliot has said, "One of the reasons for learning at least one foreign language well is that we acquire a kind of supplemental personality; one of

the reasons for not acquiring a new language *instead* of our own is that most of us do not want to become a different person." In learning that language well, you learn to feel in it, not just to think about things or ideas in it. This is analogous to what men now are doing in the sea.

There is some reason to think that, as they adapt to undersea living, men do in some way acquire a supplementary personality. Mr. Oswald mentioned that thought processes seem somehow different. Captain George Bond, who heads the United States Navy's man-in-the-sea program, has said that he sometimes felt he was losing control of his aquanauts below. They were detached from the surface, from their familiar culture and experiences. They had gone where he could not follow. They had become part of the world of the sea.

Engineers and scientists have thought a great deal about this undersea world. They have tried to anticipate its impact on man and to design equipment to help him master it. Yet, thinking in a foreign language is not the same as mastering it to the point where you share the feelings of the culture it represents. So too, men who think about the sea have to go beyond mere intellectual comprehension.

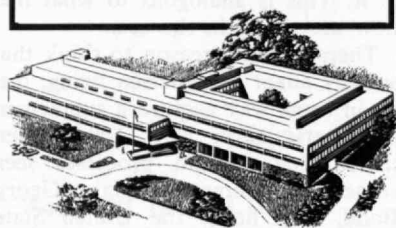
There is little doubt today that man will colonize at least the continental shelves. John P. Craven, Director of the U.S. Navy's Deep Submergence Systems Project, forecasts that living beneath the sea will become a way of life for many oceanologists directing food raising, mineral recovery, and other industrial operations.

Dr. Andreas Rechnitzner of North American Aviation, one of the pioneers in undersea operations, says that the next logical step is to integrate the man-in-sea and submarine developments into working systems. He foresees large underwater establishments in which men can live and work at sea-level pressure. They would travel to and from the surface in submarines. They would have facilities for moving outside to live and work as aquanauts in the water and under its pressure.

Will this thrust beneath the sea be merely for economic exploitation or military ends? Has the ocean nothing more to offer mankind? Or is there a world of new beauty offering a new kind of personal challenge? Is there something here that will help man gain a new extension of himself?

Mr. Goodwin is indeed right when he says there is an urgent need for poets. The divers and aquanauts today could answer this overriding question if only some of them would make the effort to communicate their inner adventures.

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Puzzle Corner

By Allan J. Gottlieb, '67
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I have received letters from several very considerate readers asking about my graduate school acceptances. I should like to thank them very much. The final outcome was that after much deliberation, I decided to accept the advantages of small classes and a new location over those of a somewhat better name (i.e., I respectfully declined M.I.T.'s offer in favor of one from Brandeis).

Several people have requested that I mail to them solutions to various problems. The advantage of mass-media communications is that many can be reached at once. In order not to surrender this advantage, and because I do still have some academic involvements, I have ignored all such letters.

Problems

78—The first problem is from Lester R. Steffens, '30.

Given: 11 balls of same weight plus one heavier or lighter (12 total). Identify the odd ball and determine whether it is heavier or lighter with three weighings on a two-pan balance. This problem and the solution have been published frequently. To make it more difficult, what is the maximum number of balls from which the odd one can be identified with four weighings? with five weighings? with n weighings?

79—The following problem is from John A. Maynard, '46.

Five island natives spend all day gathering coconuts. They finish the job when it is dark and decide to leave the coconuts in a pile and come back in the morning to divide them up. At midnight one native wakes up and decides he wants his $1/5$ now. He goes to the pile, divides it into five equal piles, and finds that there is one coconut left over. He gives it to a monkey. The native takes away one of the five piles, leaving the other four piles there. He pushes the four piles into one big pile as he leaves. At 1 A.M. native #2 wakes up and decides he wants his $1/5$. He goes to the pile, divides it into five equal piles, finds one coconut left over, gives it to the monkey, takes away one pile, and leaves the rest. At 2 A.M. native #3 does the same thing; divides into five equal piles, one nut left over goes to the monkey, takes away one pile. At 3 A.M. native #4 does the same thing. At 4 A.M. native #5 does the same thing. After native #5 takes his coconuts away, the quantity of nuts left is evenly divisible by five.

Question: How many coconuts were gathered by the natives?

80—I have received the following letter:

The Stamp Problem: Suppose the government wants to revise its postal system and create only seven denominations of stamps. To aid in automatic processing,

a maximum of only three stamps is to be permitted on an envelope (two or one are also permitted). Up to what value of postage will this cover without a break? What are the denominations of the stamps required to achieve this?

Answers: 70 cents using stamps of the following denominations: 1,4,5,15,18,27,34 cents respectively. I proved this result using a brute force technique on a digital computer. When I first heard this problem five years ago, the goal was \$1.00. It seems that eight denominations using three maximum will get to 93 cents, but no higher. I believe that six denominations using four maximum will achieve the \$1.00 result and I am currently working on this. What has bothered me about this problem, however, is the lack of my own mathematics in solving this general class of problem without resorting to the brute force method. Perhaps you know of some techniques which would be helpful here, or could put me in touch with someone similarly interested. I would appreciate hearing from you in this regard.

Sincerely yours,
Richard L. Heimer, '56

Can anyone help Mr. Heimer out?

81—Bridge problems seem popular. This is from Russell A. Nahigian, '57.

Here is one of my favorite non-mathematical puzzles I'm sure your readers will enjoy. It is a bridge problem where all four hands may be viewed.

North		East	
♥	8 5	♥	Q 7 6 2
♠	5	♠	8 6 4 3 2
♣	A K 8 6 4 3 2	♣	5
♦	A K 7	♦	J 6 2
West		South	
♥	9	♥	A K J 10 4 3
♠	K 10 7	♠	A Q J 9
♣	Q J 10 9 7	♣	—
♦	Q 10 8 3	♦	9 5 4

Bid seven hearts by South. Lead Queen of Clubs.

Problem: Make bid against any defense (after the Club lead).

82—The last regular puzzle for this issue is another problem from *pure mathematics*. The unit disk E^2 is defined as the set of all points (x,y) such that $x^2 + y^2 < 1$ (x and y are real numbers). Prove the Brower fixed point theorem which asserts that every continuous function f from E^2 to E^2 has a fixed point, i.e., there is an x in E^2 such that $f(x) = x$. Naturally, this theorem is proved in many books—no fair peeking.

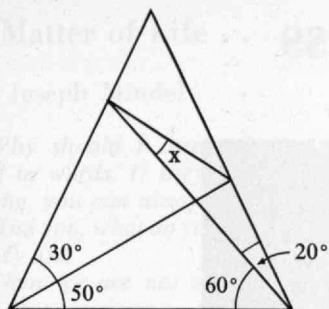
Speed Department

83—A Pythagorean triangle is a right triangle in which each of the sides is of integral length. Show that the radius of the inscribed circle in any Pythagorean triangle is of integral length.

84—Here is one from my own recent personal experience. Why do nice guys always finish last?

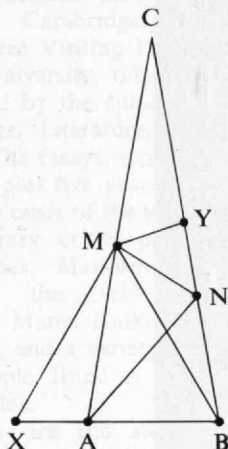
Solutions

32—Roger W. O'Dell, '68, wants you to find x :



The following is John McNear's.

Does this qualify for a year's supply of TEN? (And how!—ed.)



- 1) $BX = BM = BY$
- 2) $\angle MBX = 60$
- 3) $\triangle MBX$ is equilateral
- 4) $\angle YBM = 20$
- 5) $\angle BYM = \angle BMY = 80$
- 6) $\angle BAM = 80$
- 7) $\angle CYM = \angle MAX = 100$
- 8) $\angle MBA = 60$
- 9) $\angle BMA = 40$
- 10) $\angle CMY = 60$
- 11) $\angle CBA = 80$
- 12) $\angle BCM = 20$
- 13) $CM = BM$
- 14) $\triangle CYM$ is congruent to $\triangle MAX$
- 15) $YM = AX$
- 16) $\angle BAN = 50$
- 17) $\angle BNA = 50$
- 18) $BN = BA$
- 19) $AX = BX - BA = BY - BN = YN$
- 20) $YM = YN$
- 21) $\angle YNM + \angle YNM = \angle CYM$
- 22) $\angle YMN = 50$
- 23) $\angle NMB = 30$

Also solved by Alan S. Ratner, Craig W. Johnson, '70, Erich S. Kranz, Mark Yu, and Arthur Mohan.

33—What is the least number of queens that can be placed on a chessboard in a manner such that any additional queen would result in three being lined up?

Mark Yu, David G. Sitter, '69, John Joseph, and Richard D. Minnick all found solutions with 12 queens. Arthur Delagrang, Peter Eirich, and Douglas Hoylman found solutions with only

(Continued on page 9)

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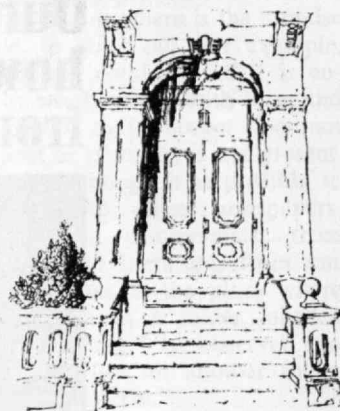
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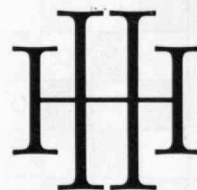
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Review on Books

A Matter of Life

By Joseph Mindel

—Why should I listen to you? You deal in words. If they turn out to be wrong, you can always find new ones.
—And you, what do you deal in?
—My life!

—Then we are not so different, you and I.

Language and Silence (Atheneum, New York, 1967, 426 pages, \$8.00) by George Steiner, Fellow and Director of English Studies at Churchill College, Cambridge, and currently Schweitzer Visiting Professor at New York University, offers more than is indicated by the sub-title, "Essays on Language, Literature, and the Inhuman." The essays, written largely during the past five years, are concerned with the crisis of the novel, the role of the literary critic, pornography, the humanities, Marxism and literature, Homer, the Bible, Shakespeare, Thomas Mann, Kafka, Günter Grass, Trotsky, and a variety of other topics and people, listed in an excellent 31-page index.

These are the subjects; but the book's theme, which is approached from many different directions, is the role of language in our culture. "What are the relations of language to the murderous falsehoods it has been made to articulate and hallow in certain totalitarian regimes? Or to the great load of vulgarity, imprecision, and greed it is charged with in a mass-consumer democracy? How will language . . . react to the increasingly urgent, comprehensive claims of more exact speech such as mathematics and symbolic notation?"

The unusual quality of the book arises from Mr. Steiner's direct, personal involvement in its subject and theme. The questions and the attempted answers are clearly as important to him in his own life as he believes them to be in the life of society. He does not arrive at general principles that he does not apply to himself. "This is how the world appears to me," he says, in effect. "This is how I believe a man—that is, I—should try to live in it." It is left to the reader to agree or not, but if he reads at all, he cannot refuse to engage.

Mr. Steiner finds a "retreat from the word" that manifests itself in many ways. The success of mathematics in explaining the workings of the universe has tempted historians, economists, and sociologists to substitute formulas, tables, and graphs for words; the

ease with which they have succumbed to temptation is notorious. Modern art reveals a similar retreat. A landscape, a still life, a portrait can be described in words, but if a painter paints what he feels, not what he sees, communication occurs outside of language. Mr. Steiner finds another diminution of language in the thinness of the Hemingway style and of much recent writing. On another level, comic strips, the mass media, and advertising replace words by pictures and music, reducing still further the already low popular literacy.

These are trends, forecasts of what might come to pass. In his controversial essay, "The Hollow Miracle," Mr. Steiner is concerned with what did happen. He analyzes with frightful, frightening illustrations the role of the German language in Hitlerism, and he concludes that it "was not innocent of the horrors of Nazism. It is not merely that a Hitler, a Goebbels, and a Himmler happened to speak German. Nazism found in the language precisely what it needed to give voice to its savagery. . . . A language in which one can write a 'Horst Wessel Lied' is ready to give hell a native tongue."

His purpose extends beyond exploring the relation of a language to history and culture. He inquires into the value of the study of the humanities. "We know now that a man can read Goethe or Rilke in the evening, that he can play Bach and Schubert, and go to his day's work at Auschwitz in the morning. . . . We do not know whether the study of the humanities, of the noblest that has been said and thought, can do very much to humanize. We do not know . . ." A teacher himself, he suggests that the failure may lie in teaching literature as a fact of the past, without considering its relevance in the present; that is, in confusing objectivity with neutrality. "Science can be neutral. . . . A neutral humanism is either a pedantic artifice or a prologue to the inhuman."

Running through the essays is the theme of silence, gliding from one meaning to another: silence as a way of understanding and communicating the ineffable; silence as the last stage in the retreat from the word ("plays in which absolutely nothing is said"); the silence beyond the extreme limits of language, creating the richness of words unspoken and music unheard ("to speak is to say less"). And finally, silence as the decision of the poet to refuse to write: "It is better for the poet to mutilate his own tongue than to dignify the inhuman either with his gift or his uncaring. . . . Silence is an alternative. When the words of the city are full of savagery and lies, nothing speaks louder than the unwritten

poem."

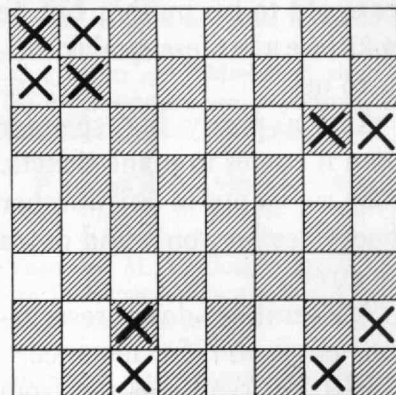
The book engages the reader wholly, so that at times there is the impulse to argue, to point out, for example, that silence is nothing until it is endowed by words or acts with form and dimension. Or that whoever does not speak, poet or plumber, is not present. Or that even though it is possible to collect evidence from newspapers, from television commercials, from modern art and literature, from our own observations in the place where we are, to file in a folder labelled "Attila Is Coming," an observer can also find materials for another folder marked "But Not Yet."

Above all, we remember that for poets, for writers like Kafka, Mann, and Mr. Steiner as well, for whom language is a matter of life, to choose silence is to relinquish a portion of life. We may be thankful that, for now, Mr. Steiner has not chosen silence.

Puzzle Corner

(Continued from page 7)

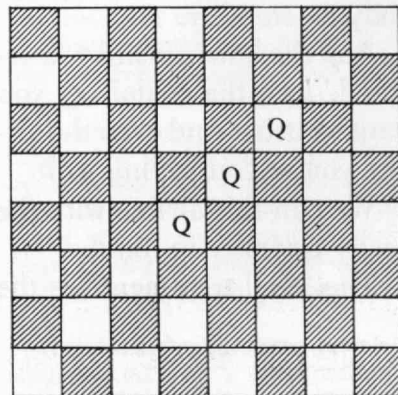
10 queens. The following is Art's.



And then there is the following:

Dear Mr. Gottlieb,

I believe that a glance at this diagram will show that it meets the conditions of your problem 33 as stated. Apparently accurate technical English is more difficult than it looks.



Sincerely,

W. Richard Ristow

(Continued on page 68)

Are you travelling on business, Mr. Tannen?



Mr. Tannen may be nine years old to his mother but he looks like a professional traveller to us.

And a pretty big spender when it comes to plane tickets.

So we've put in any number of services he won't find down the street.

A 30-million-dollar reservations computer, for instance.

Just to keep people from wandering around our terminals muttering.

This computer keeps track of every seat we have and everybody with a ticket and everybody on standby.

And the bowl of chili you ordered. And the rental car you want waiting. And even the airline you're connecting with.

We run this airline with the heavy traveller in mind.

The "full treatment" is the

only treatment we have.

So the moment a Travel Agent booked Mr. Tannen on American, he looked big for

his age to us.

All right, Mr. Tannen, put down that cocktail list and drink your ginger ale.

American Airlines

The airline built for professional travellers. (You'll love it.)

Financial Crisis— Now

By Corbin Gwaltney

A substantial number of the nation's private colleges and universities at this moment are facing a financial crisis of major proportions.

In another few weeks, most institutions of higher education will begin a new fiscal year. Will it be, for some, the year that does them in?

President Grayson Kirk of Columbia University had this to say about the situation a few weeks ago:

"It is a fair guess that if all private colleges were willing to make public the budgets which they have adopted for the next fiscal year, the aggregate anticipated deficit would be frighteningly large."

Most private colleges, of course, will survive the year. But some will not. For all—including a considerable number of ostensibly strong private universities—the long-range outlook has undertones of crisis.

Columbia's President Kirk, again:

"It is of the highest importance that our people be made to realize the magnitude of this financial problem and the dimensions that it is likely to assume in the years ahead. The plain fact is that we are facing what might easily become a crisis in the financing of American higher education, and the sooner we know about it, the better off we will be."

A Promise Fulfilled

Anyone with a reasonably clear crystal ball could have predicted the impending crisis years ago. Many did.

Ever since the 1940's, the pressures on the private colleges and universities have been building inexorably. The institutions have needed new and replacement physical plants—increasingly costly. They have had to make dramatic increases in their salary scales for faculty and staff members in order to compete successfully with other institutions.

The private colleges and universities responded to these pressures; the only alternative—a hopeless mediocrity—was one that the better private institutions could not accept.

An example of how well they responded can be found in the salary and fringe benefit figures at the leading private colleges and universities this year. The private universities, for instance, lead all other categories of institution in the average compensation

they pay to full professors (\$19,749). By contrast, the average compensation of full professors at public universities is only \$16,345.

The organization that compiled these figures, the American Association of University Professors, sees trouble coming, however. High as it is, the compensation paid by private universities is not increasing as rapidly as is that paid by other types of institutions; over the past two years, the full professors' compensation on private campuses rose 12.1 per cent, compared with a two-year increase of 15.2 per cent at the public universities.

Like most statistical exercises, this one has its inconsistencies. Even as the private universities' pay increases were slowing down this year, those at the church-related colleges were speeding up. The two-year rise at such institutions was 18 per cent. Again, however, the rise is an illustration of how the colleges must respond to pressures; the spectacular percentage increase in compensation on the church campuses was due in large measure to the low base from which it started. Even this year, after that 18 per cent jump, the professorial compensation at such institutions averaged only \$12,996—the lowest paid at any type of institution in the United States.

Analyzing its findings, the American Association of University Professors concluded that, despite the surface gloss, the private universities face financial pressures "whose magnitude and prospective rate of growth are far greater than is generally suspected."

"These institutions, which have so long taken pride in their preeminence, will not find it easy to maintain their position," the AAUP warned. "Already the differential financial incentives which they offer to their faculties are being eroded away, and the rate of attrition is by no means negligible."

So gravely do the AAUP's specialists view the situation that they plan a detailed study of what they call "the serious financial crisis that threatens the nation's private educational institutions."

Outgo over Income

At the root of the private institutions' difficulty is the fact—on which virtually all persons familiar with the situation agree—that the traditional sources of college and university income are unlikely to keep pace with the needs of the institutions. Columbia University's President Kirk views them in this way:

• **Tuition.** It has doubled—even tripled—at private institutions in the past few years. "The problem of further rises is serious," Mr. Kirk says, "because of the burden which this places

upon many parents. Also, since the institution is really interested more in the intellectual quality, rather than the affluence, of its student body, each rise in tuition requires an even greater increase in the provision of funds for student aid programs. Obviously there may come a point . . . when the net yield of a new rise in tuition would scarcely be worth the effort involved. . . . We are not likely to find any great relief from our financial problems through further tuition increases," even though it is probably inevitable that "such increases will be made."

• **Endowment.** "The endowment contribution to the budget," says Mr. Kirk, "in percentage terms has progressively declined."

• **Gifts.** "Foundations, business corporations, alumni, and non-alumni individuals have increased their support to higher education dramatically in the past decade," Mr. Kirk notes. But the amount which is expected to come annually from such sources by 1969-70—\$2 billion—will still be only "about 12.5 per cent of the amount which, according to the Department of Health, Education, and Welfare, our colleges and universities will need to spend for their operations in that year," Mr. Kirk points out. "Moreover, since the HEW projections are in constant dollars, the actual percentage will be even less."

President Kirk's views are shared by other analysts of private higher education's financial plight. The Rev. Theodore M. Hesburgh, President of the University of Notre Dame, points to the common problem: "The money we receive in tuition doesn't come anywhere near paying for this [increased cost of running the university]. But I'm afraid we've almost reached the upper limit on tuition cost already."

Is government aid the answer? Many observers say they see no other solution. But it must be government aid of a different sort from that which has dominated the flow of funds from Washington in the past. Much of that flow has been designated for specific projects—often new projects—and has done little to ease the basic financial strains that the colleges and universities have felt. (In some instances, indeed, the infusion of government funds—and new demands upon the institutions of higher education—actually may have aggravated the basic problem.)

The alternative for many private institutions may be a deterioration of their quality and, for some, eventual bankruptcy. For make no mistake: the financial crisis is real, and for some it is immediate.

Letters on Review

A Gem

To the Editor:

Every so often the Technology Review has an article which is a gem. Such a one is the one by Land and Wilson, "Education and the Need to Know" in the January 1967 issue. 29

The Land-Wilson article struck me as something truly exciting. In the last several months my thoughts have been focused upon how to efficiently teach people. I see engineers like myself nearly 30 years out of school suffering from obsolescence. We have a crying need to be reconditioned educationally. Thus far the means to do this for the engineer on-the-job have been woeefully inefficient.

My vision sees teaching machines with programmed courses. The engineer can use these on his own time schedule. With a library of courses he could select ones for generally expanding his knowledge or else select ones related to problems he expects or is facing. The big advantages are that 1) we use a very efficient educational tool, 2) the man can select the course to suit an immediate need or desire and 3) the man can suit his own time schedule. The big advantage for the company and also for society is that the productivity of the man is increased.

M.I.T. does have a program for educating select men who have been out of school and show promise to their companies. However this program is extremely limited in numbers participating. What is needed is a program that reaches out to the many thousands of engineers and scientists who stand in need of educational preventative maintenance. Will and can M.I.T. provide us with a new "Zacharias" to fill this educational vacuum?

RAYMOND E. KEYES, '40
Pleasanton, Calif. 94566

More on Fort Washington

To the Editor:

I was naturally pleased as punch to read your reference (Technology Re-

view, April, p. 104) to the joint efforts of Ralph Dunphy of the Cambridge Department of Public Works, Instructor Donald Brine and students of the Rindge Technical High School, and Professor Merton Flemings with Edward Backman of the M.I.T. Metallurgy Department, in their combined efforts to restore the extremely beautiful pike and halberd fence surrounding Fort Washington. It is no present or future dream that a very appreciable portion of it has already been restored to full beauty. Neither does it appear too imaginative to conceive that the entire fence could be restored to appear, as it does in the turn-of-the-century pictures that Cambridge citizens have recently been sending me, completely surrounding the plot.

Fort Washington itself, however, the earthwork that is the sole unaltered vestige of the 10 mile ring of fortifications the General threw around Boston to contain and ultimately expel the British, needs no restoration. It stands today as it did then altered only by the most negligible scuffing of cannon-riding boys and openness to the wind and sky.

In connection with its 1966 political campaign, the Cambridge Civic Association published a meretricious booklet containing more factual errors than the Fort Washington fence has palings. Although not the most egregious of these, the words on Fort Washington at the end of page 13, namely—"some unpatriotic hand, or else the weather, has done its worst, and today nothing can be seen but a couple of cannons, two granite gateposts, an iron fence and a number of small boys playing ball."—are such a melange of abysmal ignorance and hopeless stupidity as to warrant retiring the brochure. Unfortunately, these words gave rise to the impression that there were once some walls there, which is most assuredly untrue.

The fact of the order of the General to create a certain "half-moon" battery is a well-established piece of Americana; no one need dream of restoring that existing, priceless heritage.

DOUGLAS P. ADAMS

Associate Professor of Mechanical Engineering

M.I.T. Man

To the Editor:

On page 141 of the April issue (Class Notes) you print my picture without noting that I also am an alumnus—X, S.M., 1923; Sc.D., 1925.

ERNEST W. THIELE

South Bend, Ind.

Dr. Thiele's correction means that M.I.T. men copped two out of this year's three A.I.Ch.E. Founders Awards for chemical engineering contributions.—Ed.

Engineers' Register

To the Editor:

In your April issue on page 87, under the heading "The Cream of the Crop" you report the finding of the National Register of Scientific and Technical Personnel with the aside that engineers were not included.

Your readers might be interested to know that engineers are not *excluded*, but are included in a separate part of the register known as the National Engineers Register. Unlike the scientists' part of the register, which is intended to include all qualified scientists, the engineers' register is based on a statistical sampling of the memberships of 45 engineering societies. Engineers are also part of the cream of the scientific and technical crop, but they happen to be handled in a slightly different way.

JOHN D. ALDEN, '49
New York, N.Y.

First in Physicists

To the Editor:

Perhaps you have already seen the American Institute of Physics 1965-1966 survey of the baccalaureate sources of graduate physics students. If not, I think you will find it interesting to note that my alma mater is first in its category (large universities) and that Saint Joseph's College is also first in its category (Type I institutions granting only the bachelor's degree in physics).

REV. JOHN S. O'CONNOR, S.J., '36
Chairman, Department of Physics
Saint Joseph's College
Philadelphia, Pa. 19131

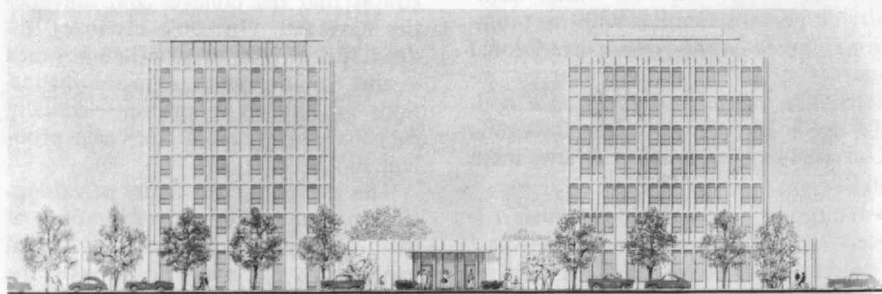
East Was West

To the Editor:

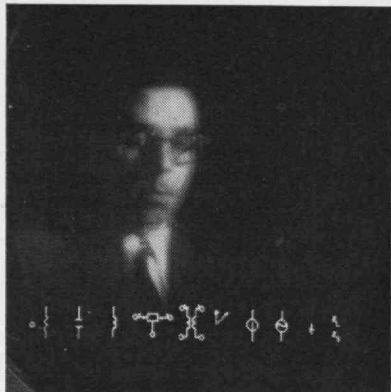
Unfortunately, on page 63 of the March issue you illustrate the original building (McCormick West), not the new addition (McCormick East).

KENNETH R. WADLEIGH, '43
Cambridge, Mass. 02139

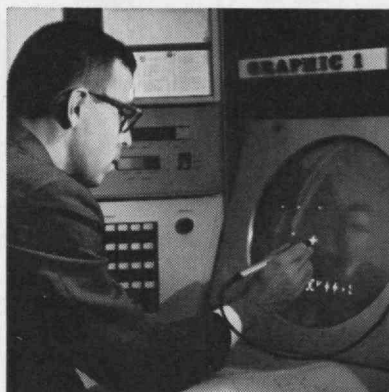
Even a mirror will not right the wrong, for the new addition to McCormick Hall differs from that first built in several architectural details. Here is a picture of McCormick East (left) and West together.—Ed.



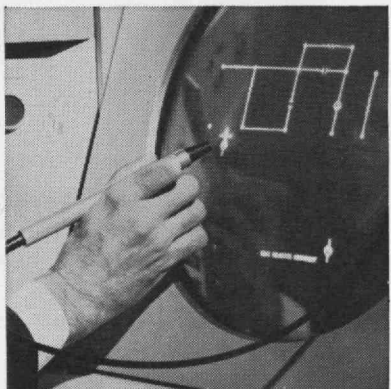
Programming Complex Problems Simply



1. A program for GRAPHIC I lets engineer W. H. Ninke draw a circuit diagram on a cathode ray tube, using familiar component symbols.



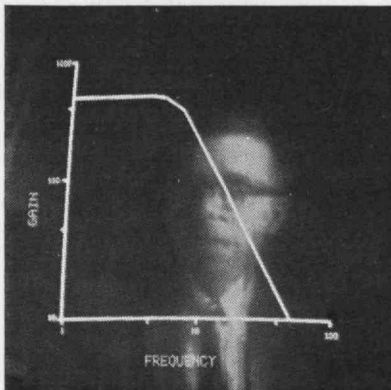
2. In describing a circuit problem to the computer, he guides nodes (circuit junction points) into place with a light pen.



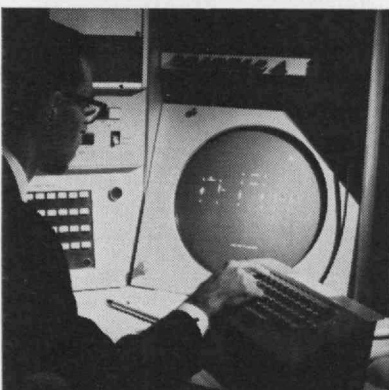
3. He next guides components into place. Where necessary, he can mark certain ones "variable" by placing a slant arrow across each.



4. With a keyboard, which resembles a typewriter, he inserts the values of the various components and the operating conditions of the circuit.



5. He asks the central computer to use this information to calculate and display a curve of gain vs. frequency response for the circuit.



6. Seeing the curve, he may modify the circuit, insert new values for variable components, request the computer to recalculate performance.

Scientists at Bell Telephone Laboratories have improved communications between engineers studying circuits and the computer that helps them. The key is an experimental console on which the engineer works with familiar graphics: component symbols, performance curves, and so on.

The engineer composes a circuit on a cathode-ray tube, inserts component values, makes certain components variable, as required. The display equipment responds immediately to his commands. As he proceeds, the console displays appropriate operating instructions. At his request, the computer calculates and displays circuit performance. He may adjust the variable components or revise the circuit and call for performance calculation again.

This sophisticated tool is not needed in routine circuit design. Its principal use will be where well established, highly automated design procedures do not exist—for example, when investigating effects of temperature, component tolerances, and stray coupling. The "conversational" ability promises to make this hardware-software system a valuable laboratory tool.

The console itself is GRAPHIC I, a man/machine computer terminal developed at Bell Laboratories. It includes a cathode-ray display, a keyboard for inserting letters or numbers, a light pen for selecting and positioning symbols on the tube, and a small display-control computer. Network analysis is handled by a separate large digital computer on a shared-time basis.

The circuit-analysis program is only one of several compiled for GRAPHIC I at Bell Laboratories. Others help generate integrated-circuit masks, design wiring patterns for magnetic-core logic devices, or retrieve documents. A special compiler (program for making programs) has been developed for GRAPHIC I. It is GRIN—for GRaphic INput.

Based on GRAPHIC I, a new generation of graphic terminals will be installed as part of an overall computer facility at Bell Laboratories.



Bell Telephone Laboratories
Research and Development Unit of the Bell System



The First Battle of World War III

Can we find a rational basis
on which to build international
anti-missile negotiations?

By George A. W. Boehm

World War I was fought with chemistry, and World War II with physics. Will modern technology culminate in a holocaust that will decimate mankind and perhaps set back civilization to the level of the Old Stone Age? Not necessarily. World War III, if it ever occurs, may be fought bloodlessly with mathematics.

That is to say, both sides may agree to simulate the war, instead of actually launching missiles and sending troops into action. They will mathematically formulate strategies and counterstrategies and let computers do the "fighting" until a conclusion is reached. Then, figuring that their side cannot do much better than the computer and the other side is not likely to do much worse, military leaders might be willing to abide by the electronic referee's decision.

It is not wholly inconceivable that two opposing general staffs will gather some day in full battle dress for a morning's war at an international computer center. At preliminary low-level conferences they will have already agreed on a computer program and, like attorneys at a pre-trial hearing, stipulated essential input data. All that will remain to be done on the fateful morning will be to push the "start" button and wait for the computer to wage the war 10,000 times. We can envision one commander-in-chief pushing aside a sheaf of print-outs that he has been poring over. "Okay," he says. "You wiped us out 9,327 times. I'll tell my Prime Minister to pull out of the Balkans. Now, how about a Martini before lunch?"

Tipping the Balance of Terror

Though this setting is altogether fanciful, the prospect of settling major international arguments by the outcomes of unfought wars is real. Indeed, it is not at all farfetched to suppose that at this writing the first phase of World War III is being contested much along these lines.

War of a benign sort was declared early this year by President Lyndon B. Johnson in his State of the Union Message to Congress. He reported that the Soviet Union had begun to deploy an antiballistic missile system (ABM). Although he went into little detail, the Soviet ABM is presumably similar to *Nike-X*, an elaborate weapons system that the U.S. has been developing in various forms over more than 15 years. The prototype was a ground-guided rocket system designed to intercept bombers. The present version of *Nike-X* has super-speed radars and computers capable of detecting and identifying four-mile-per-second intercontinental ballistic missiles, plus missiles of its own to destroy them before they reach their targets.

Nike-X has never been deployed. As far back as 1959 the Army strongly urged Congress to appropriate \$20 billion for a primitive version (which would have been obsolete before it was complete). Two years ago, and again last winter, the Joint Chiefs of Staff recommended immediate deployment. But in each instance the Defense Department insisted on postponing the decision. Secretary Robert S. McNamara has argued that it is

PHOTO: U.S. ARMY

U.S. Army's *Nike Zeus*, test firing at White Sands Missile Range, New Mexico. This was the first firing from a prototype tactical launcher. This missile, now known as the *Spartan*, is designed to intercept missiles outside the atmosphere.

wiser to wait, while preserving the option by continuing research and development at the rate of about \$400 million per year.

Meanwhile, the U.S. has continued to rely on mutual deterrence to preserve peace by making all-out war unthinkable. But now that an ABM opposes the U.S. missile arsenal, the balance of terror is being upset. How best can we preserve whatever stability mutual deterrence gives the world? It is possible to cancel out the Soviet ABM by increasing our own Minuteman and Polaris force, for an ABM can be overwhelmed either by sheer weight of numbers or by missiles accompanied by decoys that look like missiles to an ABM radar. Another obvious step is to match the Soviet ABM by finally deploying *Nike-X*.

The trouble with both these countermeasures is that they could easily lead to economic warfare that would prove almost as disastrous as an exchange of missile volleys. The Soviet Union could respond to our response by beefing up its own offensive or defensive missiles. In

Sprint missile, shown here on a test flight from an underground launching cell, provides the second prong of the U.S. *Nike-X* antiballistic missile system. In the *Nike-X* system its extremely high acceleration would enable it to destroy any missiles which escaped the *Nike Zeus* cover.

PHOTO: U.S. ARMY



order to be fairly effective against the present stock of missiles, an ABM might cost \$20 to \$25 billion, but if both sides were intent on getting ahead, and staying there, the costs could swiftly mount to more than \$100 billion for each nation. Neither nation, to be sure, would be bankrupted, but for several years the effort would pre-empt a sizable proportion of their engineering manpower and industrial production; and the whole world would suffer accordingly.

Question Marks around the ABM's

In hopes of staving off the possibility of such an arms race, Johnson has proposed that the U.S. and U.S.S.R. agree *not* to deploy their ABM's. The negotiations that have already started could very well serve as a model for settling international disputes by simulated warfare. All the elements for this kind of contest are present. The stakes are high. The need to arrive at a settlement is urgent. And though there are many areas of uncertainty, both sides could benefit from a rational solution to the total problem.

From the standpoint of game theory, the ABM negotiations are not simple. Mathematicians have pretty well worked out the theory of two-person, zero-sum games: situations in which two sides are in direct competition, with one standing to lose exactly what the other gains. The ABM situation is more complicated. In the first place there are other possible contestants to consider, such as the French, the Chinese, and other nations that might develop intercontinental ballistic missiles with nuclear warheads. Moreover, the interests of the U.S. and the U.S.S.R. are not diametrically opposite in this case. As in a labor-management negotiation, almost any kind of agreement should benefit both participants. Nevertheless, the ABM game should have a stable solution—that is, an agreement that both sides can stand to abide by for the present.

Before the negotiators can begin to discuss the situation rationally in terms of gain versus loss, they will have to reach some agreements on inputs. And this is not going to be easy. The effectiveness of an ABM—*Nike-X* or any other model—is impossible to evaluate precisely. The nuclear test ban makes it impossible to arrange a dress rehearsal of an ABM in action. Rockets and radars have been tested piecemeal, but the final judgment on how well an ABM might perform is still a risky extrapolation at best. Nor is it possible to gauge exactly how alertly an ABM might react after men and machines have been standing by for perhaps several years.

Clearly, negotiations would be easier if both sides made at least a partial disclosure of designs and test data for their respective ABM's. Whether this can be arranged is doubtful. For almost three years the U.S. Defense Department has kept highly classified a 23-volume analysis of the performance and implications of *Nike-X*. Still, even without trading secrets each side will have a good idea of its own system's effectiveness and its opponent's capability.

It is going to be much more difficult for the negotiators to establish objective values for various levels of de-

fense and offense. This boils down to an implicit agreement on a concrete value for a human life—or rather, many millions of human lives. Faith in the stability of mutual deterrence is based on the assumption that people regard lives as extremely valuable, perhaps infinitely so. Yet in view of all the bloody and hopeless wars that have been fought for minor causes, it is hard to maintain that history endorses this assumption. Nevertheless, after much patient soul searching, it is conceivable that the negotiators could bring themselves to admit roughly how far their nations could be pushed before they were willing to risk X lives, or alternatively in what ratio they would be willing to trade lives.

If the effectiveness of ABM systems and value scales for offense and defense could be established—not necessarily with high precision—negotiators could begin to evaluate various possible agreements objectively. Here economics would become a primary consideration. It should be possible to estimate the cost of ICBM's necessary to offset the deployment of a given ABM system; conversely, it would also be possible to calculate roughly the cost of additional defense to balance an increase in offense. The cost is extremely sensitive to the level of defense (or offense) that is attempted. For example, whereas it might cost Y billion dollars to protect 70 per cent of a population against a specific attack, it would very likely cost 2Y billion dollars to protect 75 per cent, and 4Y billion dollars to protect 77 per cent. In other words, it costs much more to try a little harder. These considerations, of course, must be modified by the relative economic strength of the U.S. and the U.S.S.R., for the real cost to each nation is the strain on its economy.

The Answer—Limited Deployment?

Negotiators may decide ultimately to recommend limiting ABM rather than banning it altogether. There is much to be said for deploying small versions of *Nike-X* in both the U.S. and the U.S.S.R. Unlike full-scale models, they would not touch off a major arms race, because they could be overwhelmed by present stocks of offensive missiles. Yet an ABM costing less than \$10 billion could provide the following:

- By providing broadly dispersed, though light, protection, it could virtually eliminate the danger of miniscule missile attacks—for example, a missile launched purely by accident or by some zealot, or a reckless assault by some nation with just a few ICBM's in its arsenal.
- By further "hardening" offensive missile sites, it would relieve the pressure to deploy additional ICBM's in the U.S. and the U.S.S.R.
- It could play a role in future disarmament negotiations. A nation agreeing to reduce its ICBM arsenal to a few missiles would gain no advantage from cheating a little if potential targets were thinly protected by an ABM adequate to ward off a limited attack.

Unfortunately, any treaty banning or limiting ABM's is very likely within a few years to be scarcely more meaningful than agreements outlawing the dum dum bullet and the sawtooth bayonet. The current rate of technological progress makes most weapons obsoles-

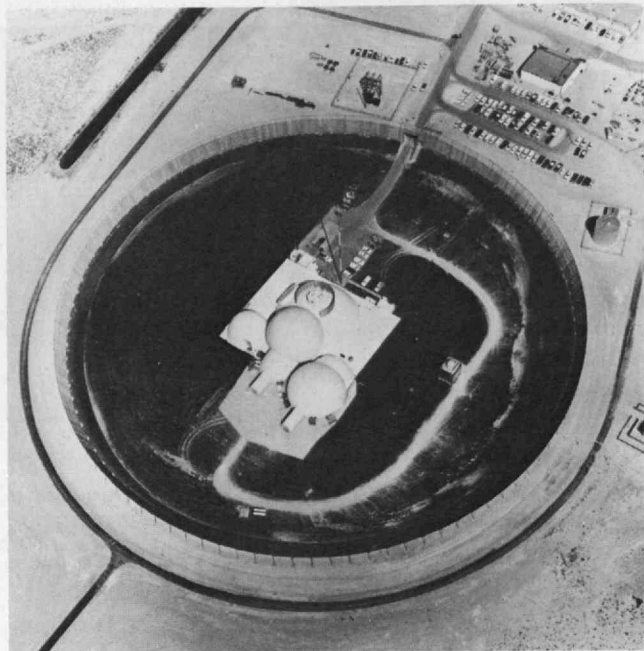


PHOTO: U.S. ARMY

Nike-X missile defense system's Multifunction Array Radar at White Sands Missile Range. Photograph shows the radar's receiver dome and two smaller transmitter domes. The radar's electronic equipment is housed in a two story building beneath the domes.

cent almost as soon as they are deployed; ABM's provide no exceptions to this rule. Cheaper and more effective ways of countering missile attacks already seem possible. A faster-acting ABM might be established in orbiting satellites. When this idea was first investigated a few years ago, the costs of putting a satellite into orbit were exorbitant, but now they are coming down sharply. Still, such a system would require so many orbiting satellites to provide enough cover that the expense might remain forbiddingly high. In the future it is going to be much easier to destroy ICBM's in hardened silos by means of missiles that can pinpoint a target within a few hundred feet. And if long-range optical scanning methods continue to improve, missile-bearing submarines may not be able to hide from reconnaissance satellites.

These developments and others will change most of the parameters in the offensive-defensive missile game. But if the present ABM negotiations can produce a treaty with a wholly rational basis, future revisions should be relatively easy. ■



George A. W. Boehm is one of the nation's pioneer science writers. He has held positions with the American Chemical Society, *Newsweek*, *Scientific American* and *Fortune*; and he is now writing on a free-lance basis. This article, specially commissioned for *Technology Review*, is an extension and updating of some aspects of the national debate on antiballistic missiles covered in his article "Countdown for Nike-X" which appeared in *Fortune*, November, 1965.

Outer Space, Strategy, and Arms Control

The present treaty is a significant start toward the goal of peaceful, internationalized space

By Walter C. Clemens, Jr.

Three steps toward space arms control in 1963 encouraged Adlai E. Stevenson to declare to the U.N. General Assembly that, in the half dozen years since man discovered how to escape from his earthly environment, "there has been enough social progress to sustain the hope that outer space will not be chaotic." The progress made in those few years, he predicted, "if pursued, could make this the first age of exploration not in the name of national glory but in the name of man himself."

Mr. Stevenson's assessment was based in part on the resolution adopted by the General Assembly in October, 1963, welcoming expressions of the U.S. and U.S.S.R. of "their intention not to station in outer space any objects carrying nuclear weapons of mass destruction." Second, Stevenson had in mind the treaty prohibiting the testing of nuclear weapons in outer space, in the atmosphere, and under water, signed in August, 1963. Third, he referred to a General Assembly Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, adopted in December, 1963.

Ambassador Stevenson was correct: Much progress had been made. For once, political planning was not doing "badly" in response to technological change. But the future remained open-ended. The great powers could revise their expressions of intent, if only because

U.N. resolutions command but moral authority. It was still possible in 1963 and it remains possible in 1967 that the arms race may be extended into outer space, even though—like World War II—this would be a conflict "nobody" wanted or even expected.

Toward a Treaty for Outer Space

Neither Washington nor Moscow is of one mind in the mid-1960's on the desirability or feasibility of exploiting outer space for military purposes. Factions within each government continue to argue both sides of the case, but it appears in 1966 that the White House and the Kremlin have opted in favor of taking decisive steps toward preventive arms control in outer space. Their intent has not been to rule out all military uses of space, such as early warning and surveillance systems, but they do seem to agree on precluding the stationing of weapons of mass destruction in orbit or on celestial bodies. To what extent Russia and the U.S. can agree to rule out all active defense systems in outer space is not clear, owing in part to the difficulty in distinguishing these systems from weapons of mass destruction.

The space treaty, endorsed by acclamation at the United Nations General Assembly on December 19, 1966, and now before the member nations' legislatures for ratification, forbids the orbiting or deployment in any manner in outer space or on celestial bodies of nuclear and other weapons of mass destruction. It also prohibits "the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies. . . ." These restrictions, together with other principles in the treaty, such as the provision that celestial bodies shall not be subject to national appropriation, represent a large step toward establishing a legal regime for outer space. But the permissive nature of the treaty must also be recognized: there is nothing in it to restrict the existing and planned deployment of missiles which, if fired, would pass through outer space en route to their targets. The testing in peacetime of such weapons as well as their use in war is permitted



Walter C. Clemens, who is now Associate Professor of Government at Boston University, was until last fall a member of the M.I.T. Department of Political Science. He holds degrees from Notre Dame and Columbia Universities and his college experience included study for one year each at the Universities of Moscow and of Vienna, joining the University of California (Santa Barbara) in 1961.



PHOTO: UNITED NATIONS

Secretary of State Dean Rusk signs the UN Treaty of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space in the presence of Anatoly F. Dobrunin, U.S.S.R. Ambassador to the U.S.; Sir Patrick Dean, Minister of State for Foreign Affairs and Permanent Representative of the United Kingdom to the UN; Ambassador Arthur J. Goldberg, Permanent U.S. Representative to the UN; and Lyndon B. Johnson, President of the U.S.

under the treaty. The accord does not proscribe the deployment in outer space of weapons not capable of mass destruction—anti-satellite weapons, anti-missile weapons (unless they involve nuclear warheads), certain weather modifiers, etc. Nor does it prohibit military support activities in outer space, provided they do not take place upon celestial bodies. Thus, a wide range of existing and planned military activity may continue.

Many questions of interpretation remain to be clarified: What, for example, is a weapon of mass destruction? Both superpowers seem to regard biological, chemical, and radiation weapons as instruments of mass destruction. Both seem clear that the treaty does not proscribe the building of orbital weapons; it even permits the orbiting of rocket launchers—provided no warhead is on board. But may not weather-modifiers, anti-satellite weapons, and lasers in the future become instruments for mass destruction? Because of questions such as these and equally important ambiguities in other parts of the treaty, one Soviet official declared: "We decided first to sign the treaty and later to interpret it." The U.S., too, has shown great interest in expediting its signature and ratification. Strategically, both the U.S. and the U.S.S.R. are reasonably content with existing threat systems for purposes of deterrence and bargaining; they perceive little gain and perhaps some losses for over-all security through extension of the arms race to another dimension—outer space.

Direct Military Applications: Bombs in Orbit

From the standpoint of either superpower, bombardment systems in space appear to be superfluous, expensive, and dangerous. Both Moscow and Washington have sufficient reason to believe that their land- and sea-based missiles and bombers already provide and will continue to provide as persuasive a deterrent as is humanly attainable. The Soviet Union is confronted with a roughly 3-to-1 U.S. superiority in numbers of ICBM and Polaris-type missiles and long-range bombers. But Moscow continues to hold almost 800 intermediate and medium-range missiles targeted on Europe,

and its strategic force is so powerful that Defense Secretary McNamara testified in January, 1966, that even the best and most costly mix of damage-limiting measures, including ABM and civil defense, could hardly hope to reduce American fatalities from a Soviet first-strike below 50 or more million lives.

At least six major considerations have been raised that run counter to this proposition. First, from the U.S. point of view, some observers argue that qualitative and quantitative improvements in the Soviet missile force may soon change U.S. "superiority" to parity or even create a "gap" in Russia's favor. Their arguments tend to overlook the dramatic and important gains in accuracy, penetration capability, firepower, and other improvements being made or projected for U.S. missiles in the immediate future. The United States need not resort to weapons in space in order to counter increases in Soviet strategic power.

Second, it is argued that weapons in orbit may be necessary to provide an invulnerable second-strike capability. But the number and quality of hardened missile silos and missile-carrying submarines possessed by both superpowers make additional weapons in space redundant.

Third, if either superpower successfully constructs an anti-ballistic missile defense against land- and sea-based rockets, it may be necessary to have weapons stationed in outer space which could penetrate these defensive systems. This thesis makes an assumption that a workable and effective defense against land- and sea-based missiles can be built and that it cannot be overcome by increases in the numbers or changes in the characteristics of these missiles. Further, it presumes that one or the other superpower builds the fallout shelters needed to protect against the radiation that would result if only a small number of enemy missiles pierced the ABM network or exploded above the defended territory. In any case, should either superpower construct a defense adequate against land- or sea-based missiles, it may also be able and willing to build one against weapons from outer space.

Fourth, it is suggested that a missile shot from orbit would afford less warning time—perhaps a total of four or five minutes—than one fired from a far distant continent. But the warning time in any case is quite brief. If there is no effective defense, a variation in warning time from an hour to five minutes makes little difference for the protection of population, although it could well be critical in ensuring that a retaliatory blow was launched.

Fifth, analysts warn that four to five years' lead time are required in order to produce a workable weapons system and that the United States should be careful not to be caught off guard by a Pearl Harbor-type demonstration of Soviet missiles in orbit. But such a contingency is very remote. For years both superpowers have been judged technically capable of orbiting missiles, but for political and strategic reasons they have chosen not to do so. The United States might indeed elect not to reciprocate if Moscow decides to launch space weapons (or build ABM defenses), for U.S. security might well be better protected by other types of compensatory measures.

A sixth contingency, despite the logic of arguments such as those cited at the beginning of this section, is that the Kremlin might be tempted to station missiles in space as a quick means of transforming the game so as to retain the bargaining position enjoyed by Khrushchev in the late 1950's. But the history of the 1950's (not to mention comparable situations in World Wars I and II) suggests that U.S. industrial capacity can quickly overtake and outproduce the Soviet Union in any dimension of arms competition in which America seems to lag.

Whether for these or other reasons, the Kremlin in 1967 seems to place its reliance on improvement of land- and sea-based offensive and defensive systems, and to show a serious interest in keeping major weapons systems out of outer space.

Other Weapons in Space

In addition to missiles in orbit, military analysts continue to evaluate the utility of other weapons of mass destruction that could be placed in outer space. The prospect of "limited war" in space continues to intrigue some Westerners. Yet information now publicly available does not suggest that a weapon can be developed which is practical, the deployment of which would enhance national security beyond the potentialities inherent in land- and sea-based weapons. A laser ray, for example, might conceivably be made effective against enemy satellites or incoming missiles. But even for these purposes the laser has an extremely high-energy requirement. As for becoming a "death ray" capable of striking civilian population, it seems quite doubtful that beam-directed energy weapons will be able to pierce the earth's atmosphere from outer space, since anything that diffuses light, such as clouds, destroys its usefulness.

Other kinds of space weapons that could be directed against terrestrial targets have been conceived, but they are not generally believed (at least in Washington) to

be cost-effective relative to missiles. As for weapons systems on the moon and other celestial bodies, most Western analysts seem to agree that the difficulties in launching a strike toward earth are too formidable to justify attempting such operations. Even an atomic-powered rocket ship, able to cruise the heavens and strike the earth, offers few advantages over existing weapons and would be much more expensive.

Research and development continues on systems of active defense that could intercept and destroy enemy missiles close to their point of firing instead of waiting for their descent over target. The difficulty and the cost of developing and maintaining such a system over enemy territory would be formidable, to say the least, but it would be still more complex to direct such defenses against Polaris-type launchings close to one's own shores. An ABM defense in outer space must discriminate not only between heat emanating from missiles and heat emanating from other sources; it must also distinguish enemy from "friendly" missiles, whether land- or sea-launched.

Studies also proceed on orbital weapons that can identify, neutralize, and destroy other space vehicles. The feasibility of rendezvous with friendly space vehicles has been demonstrated. But it is not clear that an enemy spaceship can be inspected from outside; that it could not escape rendezvous; or that it could not destroy the inspecting vehicle. Defense Department officials have indicated that it is more feasible to destroy an enemy satellite from the ground than from another space vehicle, and that the United States already has this capability.

One more type of potential space weapon should be noted here: weather control. The consequences upon terrestrial struggles could be far-reaching. Weather control—whether from space or ground stations—is probably quite undeveloped as a tactical combat device by comparison, say, with bacteriological-chemical-radiation weapons. But it is similar to them in that such swords can cut two ways, hurting the user and the neutrals as well as the intended victim. Its use by one superpower would invite retaliation by the other, as well as reduce the inhibitions of smaller powers to use whatever germ or other "dirty" weapons they had at their disposal.

All these considerations seem to mitigate against the use of weapons—large or small—in space. The treaty's approval is logical and constructive—but not really very limiting upon the parties' realistic strategic plans.

Military Support Functions

While doubts persist regarding the feasibility as well as the desirability of direct military operations in space, the accomplishments of contemporary technology make clearer the role that manned and unmanned space vehicles can have in supporting military activities on the land, in the sea, and in the air. Early warning, reconnaissance, surveillance, targeting, command and control—all these tasks can be facilitated by men and machines in space who relay their findings on their in-



PHOTO: UNITED NATIONS

The United Nations Committee on the Peaceful Uses of Outer Space has been instrumental in drafting the UN treaty limiting nuclear war in space and in other efforts to assure that space becomes an international—not a national—asset.

structions to earth.

Both Moscow and Washington seem to agree that such activities cannot be ruled out short of general and complete disarmament. In acquiescing in U.S. photo reconnaissance missions and the manned orbiting laboratory, and by carrying out similar activities itself, the Kremlin seems tacitly to have endorsed the State Department's argument that "the test of the legitimacy of a particular use of outer space is not whether it is military or nonmilitary, but whether it is peaceful or aggressive."

Given that world peace rests in part on confidence in stabilized deterrence, means to strengthen this confidence are welcome from the standpoint of arms control. For this reason improved intelligence arrived at through satellite reconnaissance missions is useful for establishing that neither side is preparing a surprise attack or embarking on other steps that could upset the balance of power.

The Janus-like aspect of reconnaissance from outer space should not be overlooked. While "open skies" may help arms control, it can also facilitate the planning and waging of war. It can provide coverage of terrestrial targets and movement that is wider, more up to date, and more reliable (less subject to enemy interception) than would otherwise be available. Command and control of military forces may be enhanced by global weapons release systems and more secure communications. There is also the possibility that improved intelligence about an enemy's weaknesses (or growing capabilities) could tempt a first-strike that might otherwise be restrained by uncertainties.

Toward the Internationalization of Space

The interaction of strategic, political, and economic factors impacting on U.S. and Soviet attitudes toward space arms control constitutes a very complex pattern. Though shifts in key variables may upset the present equilibrium, the outlook for space arms control on the whole is not dim.

The main strategic argument against bombs in orbit is that they are superfluous. Politically, the deployment of space armaments could seriously destabilize the mutual trust that adversaries in Moscow and Washington have developed over the last decade—a sense that neither side wants to provoke an atomic exchange.

Indeed, the superpowers will risk little by extending their accord to prohibit the deployment of any weapon in outer space. The potential use of manned or unmanned space vehicles for active defense or for offensive purposes seems quite limited. While some would argue that this only proves that it is unnecessary to outlaw such activities, the history of efforts toward space arms control suggests that it is safer and cheaper for adversaries to reassure one another that they do not plan to exploit militarily all possible uses of space technology. If such assurances are not made today, tomorrow may be too late, for one or both space powers may find themselves with a military space capability which they did not need or want but which defies disarmament once it exists.

It is probably impossible to legislate the prohibition of observation satellites and other space activities that can support terrestrial combat. This loss for arms control, however, must be weighed against the contribution of reconnaissance to each superpower's confidence that its adversary is not preparing a pre-emptive attack.

While the thrust of the arguments here is to cast doubt on the military utility of outer space, each space power must still seek to ensure that it enjoys free passage in outer space and equal rights on heavenly bodies. Important military support functions (e.g., communications) as well as commercial and scientific purposes will be served by national bases on the moon. It is in the interest of all to ensure that an international regime is established to exclude direct military activities from outer space and ensure that all states enjoy the same rights and obligations. In this area—above all others—the needs of all peoples require collaboration above conflict. ■

The Current Progress of Cancer Research

Cancer research was producing important results over half a century ago; why, then, do we still know so little about this disease?

By Frederic W. Nordsiek, '31

The 1966 Nobel prize in medicine and physiology sharpened general awareness of cancer, a disease always high in the public consciousness. The honor was shared by Charles B. Huggins, who was cited for cancer research done 25 years earlier, and by F. Peyton Rous for a cancer finding reported no less than 55 years ago. While the scientific community, notably a critical and jealously competitive clan, acclaimed the appropriateness of these prizes, they did stop to question these quarter-century and half-century delays. Informed laymen, however, asked a more fundamental question on the progress of cancer research.

The public has a generally alert concern about human cancer. Since this disease has personal impact upon so many, announcements of even the most trivial observations relating to cancer inevitably make newspaper headlines. Indeed a contrived spate of cancer research news stories appears nationwide each spring, coincidentally with the annual fund-raising campaign of a national voluntary health agency. Thus expectations are kept alive year after year, and thoughtful laymen are inclined to become increasingly impatient. A reading public thus conditioned was reminded, through the announcement of the Nobel award to Rous, who showed for the first time that viruses could cause cancer (albeit in a chicken), that substantive cancer research was producing important results as early as 1911—over half a century ago.

Why then, many have asked, has not more progress been made by 1967? Why, although cancers of the stomach and uterus have declined, have total cancer illness and death rates continued to rise steadily, even when corrected for increasing numbers and average age of the population? A major reason for the exasperatingly slow advance of useful knowledge about cancer is this: cancer research is acutely subject to a basic dilemma that harasses all biomedical investigations.

Louis Pasteur, whose philosophic analyses of scientific methodology were as forward-looking as his pioneer laboratory observations, noted that science as it progresses seeks answers to questions of ever-increasing subtlety. Today, at one end of the spectrum of modern biomedical research, investigators work at a level of subtlety undreamt of in Pasteur's day. These are the so-called "molecular biologists" who address themselves to the fundamental nature of living cells in terms of the interactions of specific macromolecules. At the extreme other end of the biomedical research hierarchy lies the application of available knowledge to improve the lot of sick people, or hopefully to forestall the incidence of disease. Here, though, art often transcends science and a large component of empiricism remains the core of much modern medical care.

Thus present-day biomedical investigators face this dilemma: only fundamental inquiry into the nature and function of living cells can ultimately elucidate healthy and diseased states in mankind. But molecular biology, fascinating as it is, for the moment remains an essentially impractical activity. Thence, as biomedical re-

search passes from theoretical investigation to practical development and application, less and less basic, and hence less generally applicable, knowledge emerges, although often immediately useful if circumscribed measures are provided.

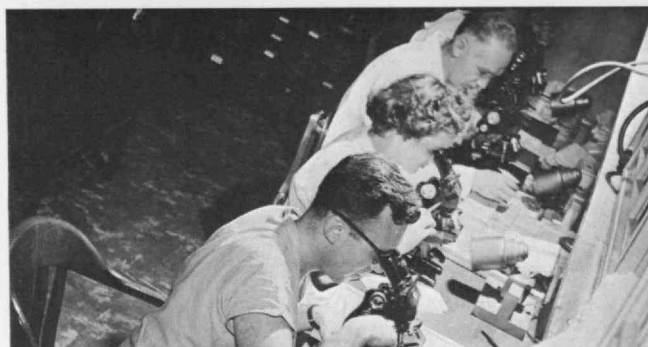
Cancer Research Today

If we attempt to classify present day cancer research in an array extending from the theoretical to the practical, we may say that such investigations are concerned with:

1. Biological macromolecules (e.g., nucleic acids, proteins) and their chemical-physical interactions;
2. Ultrastructure of the living cell and its function at the microscopic and submicroscopic levels;
3. Experimental "transformation" in tissue culture of normal cells to cancer cells;
4. Function of the mammalian body as an integrated whole, including the effects of hosts upon tumors and the converse;
5. Experimental tumors in animals maintained by transplantation or induced by chemicals, radiation, or viruses;
6. Potentially useful anticancer drugs;
7. The natural history of cancer in man viewed clinically (on individual patients) or epidemiologically (on populations);
8. Procedures for early, accurate detection and diagnosis of cancers;
9. Improvements of conventional techniques, devices, and procedures for treating cancers by established methods (surgery, radiation) and by experimental methods (drugs, immunization).

Today much wholly fundamental biological, chemical and physical research, with no obvious application to any disease, is pursued in the name of cancer at cancer research centers and by expenditure of money allocated for cancer investigation. Indeed in the early days of the National Institutes of Health of the U.S. Public Health Service, before establishment of the National Institute of General Medical Sciences, much of the noncategorical research in biomedicine in the United States was supported by the National Cancer Institute. Such means of paying for basic biological investigation is entirely appropriate. As the second leading cause of death in the United States today, cancer must carry its proportionate burden of support for fundamental research. As the most baffling medical research problem of all time, cancer research particularly needs a steadily growing pool of basic biological knowl-

Three aspects of the continuing fight against cancer. At the most fundamental level, biochemists are performing basic research on the properties of macromolecules such as nucleic acids and proteins (center). At the next level of complexity, investigations of the ultrastructure of the living cell and its functions using techniques such as electron microscopy (top) are leading to a fundamental understanding of cells which may eventually be the springboard from which to mount a comprehensive attack against cancer. But cancer sufferers today cannot wait for such breakthroughs; they must rely on accurate diagnosis by pathological and other methods (bottom) and improving treatment techniques.



Experimental surgery on animals in which cancers occur spontaneously or have been implanted or induced represents one major direction in cancer research. But at present there is little real evidence that results from work on animal tumors can be extended to human cancers.



edge, from which to draw concepts and experimental techniques.

But cancer research is also a very special field, and copes with very special difficulties. First, cancer is not a sharply defined problem. In fact it is not even a single disease, but rather is a concept. Therefore cancer today is unlikely to fall to a target-oriented problem-solving approach, such as served effectively to develop an atomic bomb or to subdue an infectious disease, like poliomyelitis, produced by an identifiable agent.

Other special difficulties of cancer research may now be examined in terms of the last seven of the nine facets of activity tabulated above. These are areas of investigation using approaches and techniques unique to cancer studies, such as the changing of normal cells in tissue culture into cancer cells.

Investigators have succeeded in thus "transforming" mammalian cells of various sorts, including human cells, by applying agents known to induce cancers in experimental animals, including chemical agents, and also physical agents in the form of radiation. Notably, though, transformation of cells in culture has been produced by viruses known to induce certain tumors in some animals, although never clearly implicated in human cancers.

At first glance, such tissue culture methods might appear to provide ideal means for finding out how cancer originates. But unfortunately we cannot make tissue culture systems subject to the influences which in animals or man appear to determine the induction and progression of cancers. These influences are the hormones (circulating products of the ductless glands) and the impact of immune factors. Furthermore, cell lines carried in tissue culture often transform *spontaneously*. That is to say, they develop cancerlike characteristics without intentional application of carcinogenic chemicals, radiation or viruses. Such spontaneous transformation at present remains as mysterious as the spontaneous origin of tumors in the human body.

The fourth facet of cancer research, effect of the host upon the tumor, has been a fruitful area of study. Indeed Huggins' achievement in 1941, for which he gained his share of the 1966 Nobel prize, was made in this area. Observing that cancers of the prostate gland in men are influenced by male sex hormones, Huggins effectively applied castration to reduce such hormone levels in patients suffering from cancers at this site. Subsequently, many other investigators developed hormonal treatment of other cancers and applied it successfully.

Now, however, a different body mechanism, the immune system, has come to the fore as a major effect of the tumor-bearing host upon tumors. The immune system is a mechanism which combats infections, and which also hampers the grafting of organs from one person to another. Some tumors in experimental animals have been found to elicit immune responses in their hosts. It has also been possible occasionally to foster immune responses in experimental animals to the point that their tumors are rejected. But unfortunately there

is, as yet, no conclusive evidence that human tumors do, or can be made to, evoke specific immune responses. Even more unfortunate is the fact that some of the anticancer drugs (on which I shall touch in a moment) are known to suppress natural immune responses of the human body.

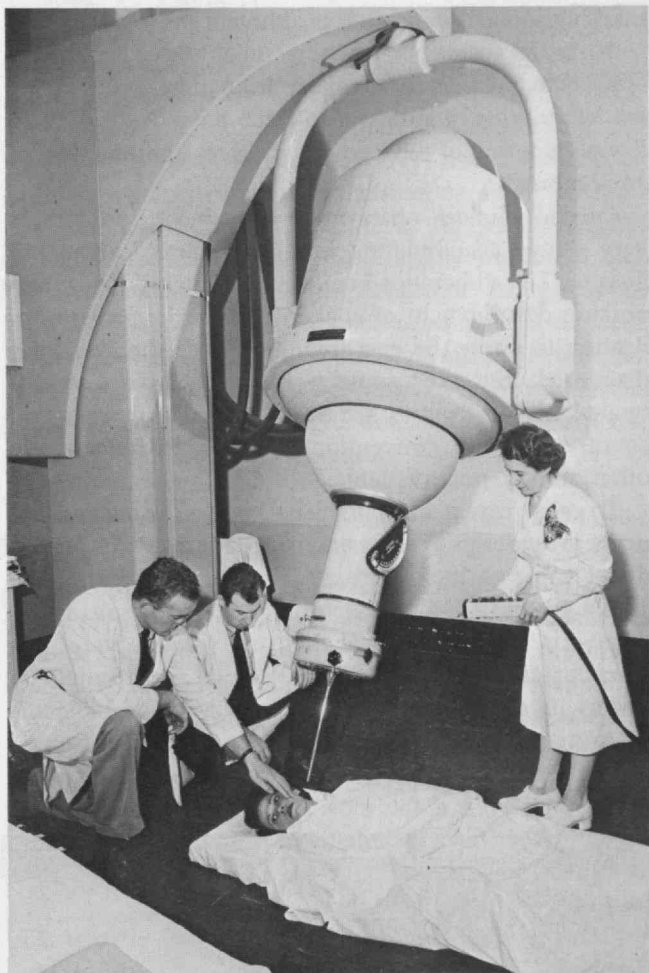
Transplanted tumors, which I have listed as a fifth special facet of cancer research, have been used experimentally for decades, since the very beginnings of cancer study. These tumors have been employed both for research and for preliminary testing of anticancer measures, particularly drugs. Transplantable tumors originated from spontaneous or induced animal tumors. But during long periods of passage from animal to animal, these tumors have usually changed markedly. Indeed separate lines of a given tumor maintained by different workers in different laboratories often come to differ widely in nature and responses. Therefore transplanted tumors may be viewed as curious laboratory artifacts that rarely represent the animal tumor from which they originated. Manifestly, then, they can at best have fortuitous similarity to human tumors.

Anticancer Drugs—a Limited Impact

The vast and costly quest for an anticancer drug has had to depend almost entirely on three transplanted tumors maintained in a single species, the mouse, for initial assessment of materials. Often small amounts available for test and transient shortages of appropriate test animals have limited trials to a single type of tumor. In this program a quarter of a million materials have been tested, with the expenditure of well over a quarter of a billion dollars. The restricted usefulness against human cancers of drugs that have emerged is scarcely surprising in view of the inherent limitations of transplanted tumors, to say nothing of the variable nature of cancer. Unfortunately fundamental biochemical leads suggested by failures of the cancer chemotherapy search often have remained unexploited. Thus the urgency of the quest has diverted many investigators from taking time out to find out why some substances active against tumors in experimental animals later turned out either to be inactive in man or else so toxic as to be useless.

During World War II, when hostilities cut off the supply of quinine, a crash development program with plentiful funds quickly provided a synthetic replacement. A similar approach is less likely to prove successful in the quest for an anticancer drug; for who is to say what drug action is being sought? And the toxicity of anticancer drugs, just alluded to, is a special difficulty. Thus drugs designed for, say, the relief of pain or the production of sleep are used only if they are effective in a small fraction of the dose having poisonous effects. But since anticancer drugs seek to poison a tumor which is biologically all too similar to the host in which it grows, these drugs must be used at the very threshold of their toxicity. Hence deleterious side effects must be accepted which would lead to the rejection forthwith of drugs designed for other purposes.

Increasing understanding of how to apply radiation therapy to cancer is one of the reasons why one-third of the cancer cases now brought to medical care are successfully treated. Improvements in surgery are likewise contributing to progress in treating cancers.



The Proper Study of Mankind

If, then, experimental approaches to cancer are so baffling, what can we anticipate from painstaking observation of "nature's experiments," from close study of the natural history of human cancers? Epidemiology—a statistical study of human populations in terms of their environmental exposures and disease incidence—has, as applied to cancer, been fruitful if controversial. Thus exposure of industrial workers to chromates was established as a cause of human lung cancer on the basis of purely epidemiological evidence. No experimental animal is subject to this carcinogen, and clearly the definitive experiment cannot be done on human beings. Equally cogent and accepted by many critical authorities is the epidemiological evidence that cigarette smoking induces cancer. But although the observations with regard to chromates were quickly and effectively applied to prevent lung cancer from this minor cause, the habituating qualities of tobacco have delayed effective elimination of tobacco carcinogens from the human environment.

Careful clinical observation of cancer sufferers is very slowly accumulating useful knowledge about the disease. The difficulties here are the generally slow and obscure development of cancer, and the immediate obligation to apply the best treatment once the disease is diagnosed. But now some well-recorded data on untreated human cancers are being compiled in emerging countries, where conventional cancer treatments are often simply not available.

To what extent are clinicians justified in asking patients to undergo experimental procedures of unproven direct value to their disease? The last few years have seen a ground swell of concern about this serious issue. Thus was set in train throughout the United States unprecedented consideration, by official and unofficial bodies alike, of the rights of human subjects in biomedical investigation. It now becomes clear that risk of physical or emotional injury, including pain or discomfort, is but one, even if the most grave, of the dangers involved. Other risks include those of invasion of privacy, of deprivation of time and energy, and of temporary loss of personal autonomy.

"Informed consent," then, becomes the crux of this problem. Human subjects may ethically be used in biomedical studies only if they are capable of appreciating all the potential risks they face, are in a position to

give or deny consent to participate entirely of their own volition, and are given a clear explanation of the proposed study. Here again cancer studies suffer from a special difficulty superimposed upon those generally prevailing. Doctors usually tell the sick what their trouble is; but even in this day of philosophic enlightenment about disease such candor is not always extended to the cancer patient. If a human being is a suitable subject for a study because he has cancer, how can he be told? If he is not told, how can he give truly informed consent? Failure to resolve this problem, in the view of some respected investigators, is now blocking useful cancer studies.

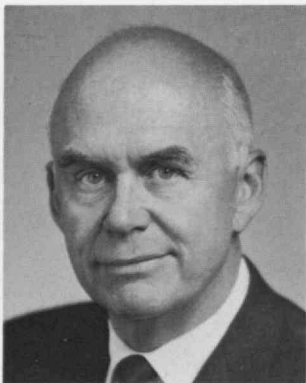
Unglamorous Advances but Solid Progress

Thus, finally, we arrive at the improvements in detection, diagnosis and treatment of cancers where solid progress *has* been made in recent decades. Indeed, it is mainly as a result of this purely developmental, non-basic progress that now some one-third of the cancer cases brought to medical care are successfully treated, whereas in the late 1930's fewer than one out of five achieved a so-called "cure." Improvements in technique for the extensive surgery sometimes needed in cancers, and better understanding of how to apply for cancer treatment the high-energy radiations now available as the result of engineering progress give examples of this progress. Other instances of better means of handling cancers, quite independent of understanding the disease itself, include substantial medical improvements in coping with secondary effects of cancers on the human body, including anemias, increased susceptibility to infections, and derangements of blood clotting.

An often-cited paradox of biomedical research is that the cause of a disease need not be found to enable effective cure or prevention (e.g., smallpox) and that identification of the cause of a disease does not necessarily directly or quickly produce a means of control (e.g., pulmonary tuberculosis).

Human cancer can be used to illustrate both poles of this paradox. Thus although some controversy remains, cigarette smoking is widely accepted to have a causal relationship to lung cancer in man. Yet economic, sociological, and psychological factors have militated against general application of this knowledge. Conversely, the increasingly effective methods of diagnosing and treating cancers have been advanced, in the main, with no knowledge of the initial cause or fundamental nature of the disease. Now, with enactment by the United States government of the Heart Disease, Cancer and Stroke Amendments of 1965, and with liberal funds appropriated to foster provision to all of optimal medical care for these three "killer diseases," recognition has come of the value of proved if empirical measures.

Perhaps now the pendulum may be swinging too far towards emphasis on empirical anticancer measures and too far away from basic research in the disease. Both avenues need to be pursued relentlessly in the quest to eliminate the threat of cancer. ■



A regular contributor to Technology Review of many years standing, Frederic W. Nordsiek, '31, is vice-president of the Sloan-Kettering Institute for Cancer Research. Before joining the Sloan-Kettering Institute in 1961, Dr. Nordsiek was assistant secretary to the Research Committee and executive officer of the Research Department of the American Cancer Society.

A New View of Mars

The “classic” evidence for life on Mars can be understood simply in terms of the planet’s topography

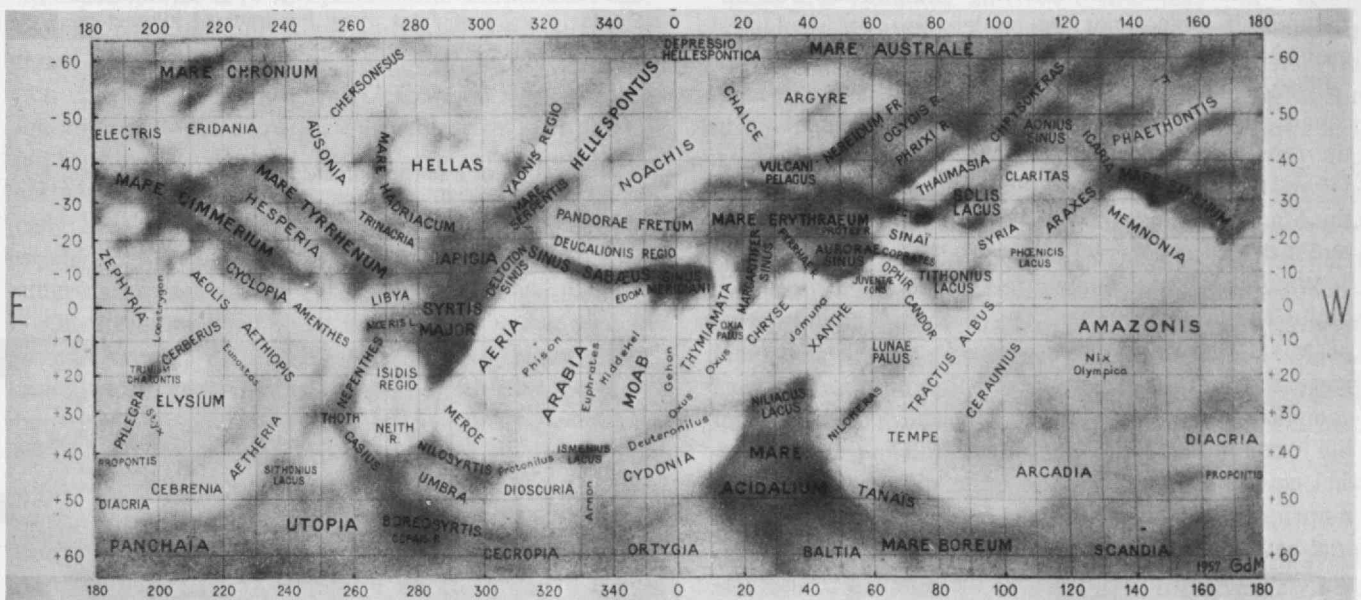
By Carl Sagan

Of Earth's fellow planets in the solar system, Mars is the one about which we know most. Venus, Jupiter, Saturn, Uranus, and Neptune are shrouded by clouds and are, in varying degrees, mysterious. Mercury and Pluto are extremely difficult objects to observe, Mercury because of its nearness to the sun, and Pluto because of its immense distance from us. Mars, on the other hand, is very rarely cloud-covered, and at such favorable oppositions as those of 1956 and 1971 comes as close as 35,000,000 miles to the Earth, permitting resolutions of a few hundreds of kilometers by such diverse techniques as photography, infrared radiometry and optical polarimetry. And at such times visual observations can obtain on occasion a resolution on Mars of some 10 kilometers.

As early as the Eighteenth Century visual observers of Mars noted that the surface could be separated into bright and dark areas, which were soon called, by analogy with the Moon, *maria* (that is, seas), and *continentes* (continents). Later observers noted white polar caps whose sizes varied with the seasons. In winter, they can extend toward the equator as far as 60 degrees latitude, but in late spring they rapidly shrink; in fact, the South polar cap vanishes altogether. Long scrutiny of Mars has revealed a number of enigmatic features, some of which have been popularly attributed to life on that planet. These observations must refer to real Martian features, and any thorough understanding of the planet must account for the observations. We here list a few of them:

- The apparent bluish-green coloration of the Martian dark areas.
- The Martian seasonal changes, particularly the wave of darkening. This is a progressive darkening of the dark areas, beginning at the edge of the vaporizing polar cap and progressing at a rate of very roughly 35 km per day toward and across the equator. Associated changes in the color of the dark areas have also been reported. Accompanying these seasonal changes are

The International Astronomical Union map of Mars in Mercator projection. This map was compiled from photographic evidence exclusively and has an effective ground resolution of a few hundred kilometers.



changes in the polarization of sunlight reflected from the dark areas. The changes can be understood in terms of an increase in the average particle size (about 0.1 mm) at the time of the springtime darkening.

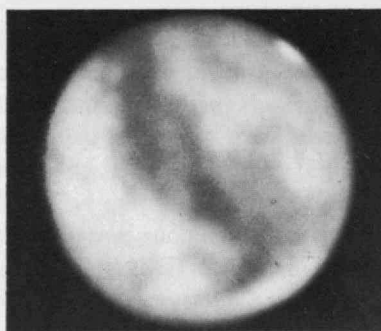
- **Secular changes.** The configuration of bright and dark areas on Mars does not generally vary over long periods of time, as a comparison of maps made a century ago with contemporary maps shows. Yet there are some features which characteristically undergo erratic changes in configuration, many such changes being in the nature of topological deformations, rather than the appearance and disappearance of features. By contrast, others seem never to exhibit such changes. Generally speaking, small dark areas surrounded by bright areas on many sides tend to show secular changes more often than larger dark areas.

- **The canals.** These are approximately straight markings, although the longer ones are alleged to follow great circles. Some are large and irregular; others are very thin and dark; both generally cross bright areas connecting dark areas with each other. They are said to undergo seasonal changes similar to those observed for much larger dark areas.

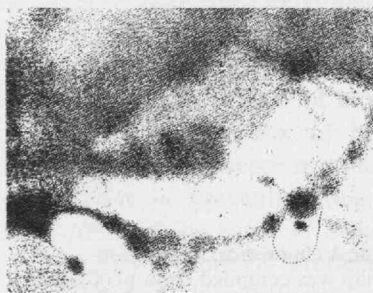
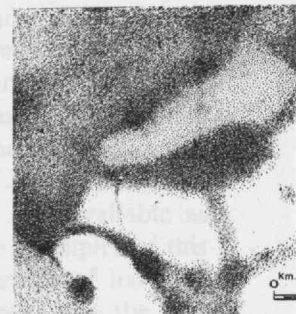
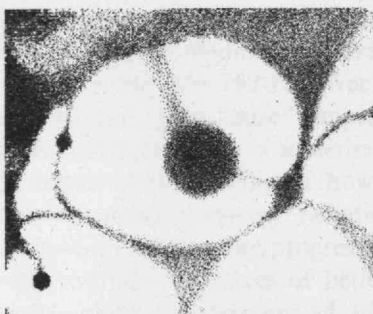
Evidence for Martian Life?

In the past all these characteristics have been attributed to life on Mars. The apparent greenish or bluish tint of the Martian dark areas has been interpreted as vegetation. The seasonal changes have been understood in terms of the springtime growth proliferation and darkening of small organisms inhabiting the Martian dark areas when the temperatures are higher and the humidity greater. The secular changes have been attributed to ecological successions—the botanical colonization of bright areas previously uninhabited or the subsequent death of the colony of organisms. But the most spectacular interpretation of Martian phenomena in terms of the springtime growth proliferation and American astronomer Percival Lowell, who first popularized the Martian canals around the turn of the century, argued that their unerring straightness was unnatural; it could not be understood on geological grounds, and therefore was the product of Martian intelligence. Lowell argued that the canals were, in fact, canals, carrying water from the shrinking polar cap to the thirsty inhabitants of the Martian equatorial cities. (Even then it was known that the amount of water in the Martian atmosphere was substantially less than that in Earth's atmosphere.)

We do not know enough to exclude *a priori* all such biological interpretations. The primitive environments of Mars and Earth were probably very similar, and various lines of evidence suggest that the production of complex organic molecules which lead to the origin of life is common in such environments. The present physical environment of Mars is quite different both from its primitive environment and from the present terrestrial environment. The atmospheric pressure is about 1 per cent that of the Earth, and the atmosphere is composed of at least a few tens of per cent of carbon di-

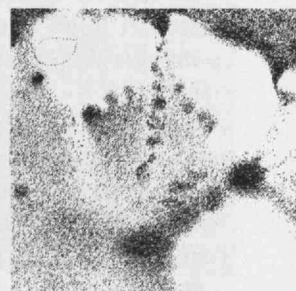
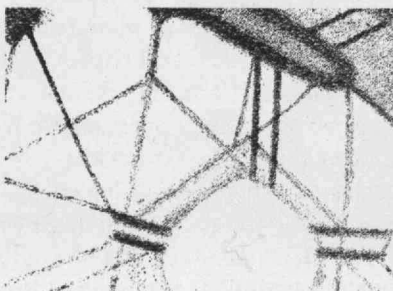


Two photographs of Mars taken in the 1940's at Pic du Midi Observatory illustrate the wave of darkening. At right, in early Martian spring, the polar cap is observed to be extensive, and the contrast between bright and dark areas is moderate. At left, in Martian summer, the polar cap has diminished substantially and the contrast between bright and dark areas has been markedly increased.



Four drawings of the same region of Mars, in 1877, 1911, 1924, and 1926. The last three drawings are by E. M. Antoniadi. Secular changes of areas many hundreds of kilometers across can be seen.

Two drawings of a portion of the Martian canal network, at left by Schiaparelli, the discoverer of the canals, and at right under excellent seeing conditions by E. M. Antoniadi, who observed the canals to be resolved into a linear array of disconnected fine detail. The alignment of this detail, however, remains to be explained.



oxide. The remainder is probably nitrogen, although small quantities of water vapor have been detected.

The average temperature—averaged over day and night, latitude, and seasons—is about 210 degrees Kelvin, quite cold by terrestrial standards. The daily and seasonal temperature variations during Martian days and years are quite extreme; at the equator in summer, noon-time temperatures go above 305 degrees Kelvin, clement by terrestrial standards, although the average temperature that night will be some 100 Kelvin degrees cooler. The absence of oxygen and ozone from the Martian atmosphere means that ultraviolet light between 2,000 and 3,000 Å will probably reach the planet's surface.

Despite the low temperatures, low humidities, absence of oxygen, and high intensities of ultraviolet light in daytime, it is by no means clear that even terrestrial microorganisms may not survive on Mars. In fact, experiments in which common terrestrial microorganisms are exposed to simulated Martian conditions show that many varieties of terrestrial microorganisms will survive these conditions indefinitely, and—in the presence of increased moisture content—grow. Martian organisms, if any exist, should do even better.

Defining the Landscape

The Martian bright areas are commonly called deserts. There are a variety of reasons for this designation. Both the photometric and polarimetric observations show evidence of fine particles. The variation of temperature with time of day, as deduced from infrared radiometry, shows that the thermal conductivity of the surface is extremely low, and characteristic of fine powders. And finally, observations are often made of dust storms, fine material characteristic of the bright areas being lifted up and temporarily covering dark areas.

The photometric and polarimetric properties of the material in the bright areas are commonly ascribed to goethite or limonite, both polyhydrates of ferric oxide. There is some debate on whether goethite and limonite constitute a major fraction of the Martian surface, but little doubt that they are present. In fact, the general reddish coloration of Mars is readily understood in terms of absorption of blue light by iron. This absorption continues into the ultraviolet, and the presence of limonite on Mars provides excellent ultraviolet shielding for any organism present. In addition, if hypothetical Martian microorganisms are capable of enzymatically breaking the hydration bonds of limonite, they would have available a major source of water on an otherwise rather dry planet.

On the other hand there is certainly no evidence to suggest strongly that there must be life on Mars, and it is well worth pursuing the question of whether the Martian observations I have alluded to cannot be understood in nonbiological terms. For many years, the majority of astronomers have believed that at least two of them can be so understood. The greenish-blue coloration of the bright areas appears to be due, at least in part, to a psycho-physiological effect. When the eye views a brightly colored material (in this case the

orange ochre deserts) next to a neutrally colored material (here the grayish *continentes*) the eye attributes the complementary color of the brightly colored material (in this case greens and blues) to the neutrally colored material. Seasonal changes in the contrast between the Martian bright and dark areas can account for the reports of color changes. In fact, photometric observations of the dark areas of Mars show them to be slightly red but significantly less red than the bright areas. Similarly the canals have alternative explanations. Under the steadiest seeing conditions many observers find that the canals can be resolved into an array of disconnected fine detail. If this is indeed the case, then the canals are unlikely to be the constructions of intelligent beings, although the linear ordering of the disconnected fine detail remains to be explained.

Possible nonbiological explanations of the seasonal and secular changes of Mars have arisen from our recent studies of Martian topography. These studies, which have other unexpected consequences of a geophysical nature, I performed in collaboration with James B. Pollack of the Smithsonian Astrophysical Observatory.

The traditional view has been that there are no major differences in elevation on Mars; and that what differences do exist are generally bright areas as highlands and dark areas lowlands. This view arose in part from lunar analogy but there is also another reason for it: on the Earth, the lowlands are warmer. If we wish to imagine organisms on chilly Mars, it would be nice if they were localized in the warmer areas, and since there were already several suggestions that the dark areas were the abodes of Martian life, it seemed reasonable that the dark areas were lowlands. Also, it has long been observed that during the retreat of the polar cap, isolated islands of frost form essentially every year in a few particular bright areas. In fact, one such area, the Mountains of Mitchell, is called "mountains" on these grounds alone. Here again, the implicit assumption that highlands are cooler, and therefore that bright areas are highlands, has come into play.

Now it is certainly true that highlands are cooler on Earth, but need this necessarily be true for Mars? On Earth the temperature decreases as we climb uphill for three reasons: (1) A diminished greenhouse effect above highlands; in other words, there is less gas to absorb infrared radiation above the highlands because there is less total gas above the highlands. (2) The exchange of heat by radiation and conduction between highlands and parcels of air which have adiabatically expanded and then have cooled on rising. (3) Almost by definition, a highland has more area than an equivalent lowland; the same amount of sunlight is distributed over a larger area, and the amount of sunlight per unit area is less.

In the case of the Earth, it is possible to calculate the magnitude of these three effects, and they collectively yield a cooling of highlands several kilometers high of some tens of degrees—in accord with our experience. But on Mars the atmospheric pressure is much less than

Mariner IV photograph of the Martian surface. The large central crater with its western ramparts almost entirely missing provides good evidence for extensive erosion of the Martian surface. Studies of Martian cratering statistics confirm this view. Windblown dust is one likely source of erosion, although there is some question of whether it is adequate to account for all the erosional features seen. Marked by arrows in this figure are two rectilinear features, smaller than the canals visible from Earth, but possibly similar in nature. The upper such feature is thick enough for us to resolve it and its shadow; from the direction from which sunlight is falling, it is clear that it is a ridge.

viewed which characteristically undergo secular changes had much more shallow slopes (one to two degrees) than other, more permanent, dark areas. This suggests to us that the secular changes can be understood in terms of windblown and drifting dust. Those dark areas which have shallow slopes are more easily covered and uncovered than dark areas with steeper slopes and greater elevations. The general topological character of these secular changes seems consistent with this idea.

If the secular changes are due to windblown dust, might we not understand the seasonal changes in similar terms? We find that essentially all the photometric and polarimetric properties of the bright and dark areas can be understood if the surface is largely goethite. The principal difference between the bright and the dark areas is the size of the goethite particles. The larger particles have a larger optical depth and permit a smaller fraction of the photons striking them to emerge out the back side, therefore reducing the amount of multiple scattering of sunlight as well as the albedo of the areas covered by large particles. As I have mentioned, dust storms are observed fairly prominently on Mars; also, the most recent theoretical meteorological calculations show that dust storms should be prominent. Depending on the boundary layer conditions at the surface, and the mean wind velocities, particles in a range of sizes should be lifted into the atmosphere, and then fall out according to the Stokes-Cunningham equation. However, it is clear that the smaller (and therefore brighter) particles will be preferentially lifted, and will remain longer in the atmosphere. The wave of darkening can be then understood in terms of a springtime scouring of the small particles off the highlands, leaving the larger particles (seen polarimetrically) and therefore the darker particles (seen photometrically) on the highlands. In the summer and fall, the meridional temperature gradients are larger, and resulting thermal winds should be larger; small particles should be lifted back up on the highlands from the adjacent bright areas, completing the cycle of seasonal changes. The particle sizes required for such motions are in the size range of tens to hundreds of microns, consistent with the particle sizes deduced from light scattering on Mars.

Completing the Topological Picture

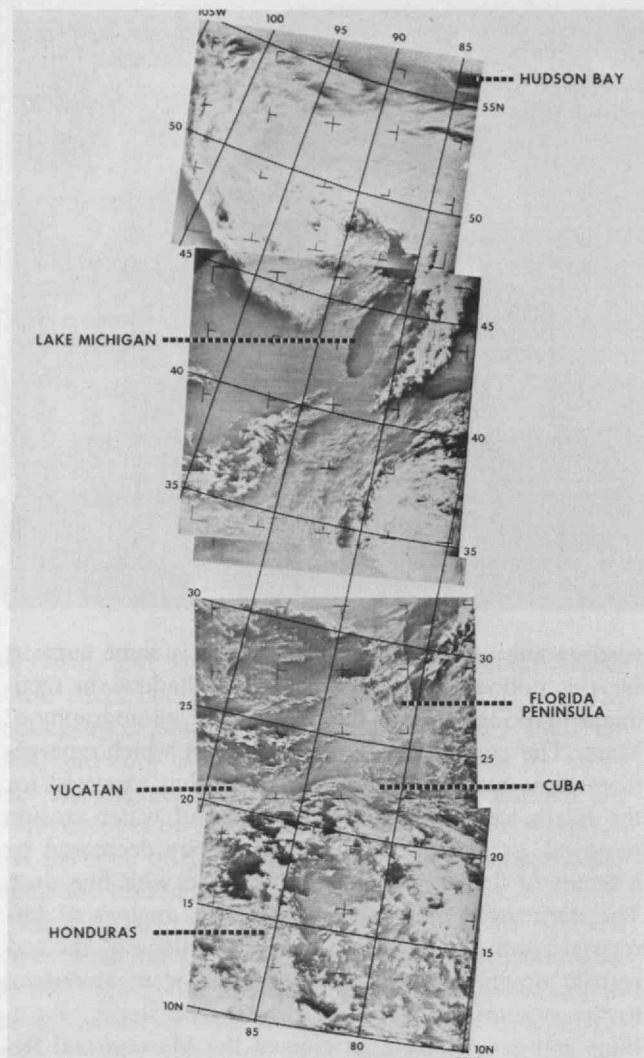
One other unexpected result from the radar observations was the implication that the canals of Mars are highlands as well—two of them gave displaced radar reflectivities. It then follows that the canals of Mars are either ridges or mountain chains, protruding above the



surrounding ocean of fine dust. There is some support for this notion from the direction of shadows in rectilinear markings seen in the *Mariner IV* photography of Mars. The general topography of Mars which emerges from these studies is very similar to that expected for the Earth were the oceans and signs of water erosion removed, the acceleration due to gravity decreased by a factor of 2.5, and the planet covered with fine dust. The dark areas appear to be Martian analogs of terrestrial continents, the bright areas analogs of the terrestrial ocean basins, and the canal system analogous to the system of suboceanic ridges. The slopes, elevations and general configuration of the Martian and terrestrial features are quite similar, when corrected for the different surface gravities on the two planets.

The mass and moment of inertia of Mars as well as models of radioactive heat generation in planetary interiors have suggested that Mars is not a very differentiated planet. It is much less likely, for example, to have a sizeable iron core, as does the Earth. Therefore, the presence of something like continents or continental nuclei on Mars surely says something about the connection between planetary differentiation and the origin of continents. While the terrestrial oceans more or less fill the terrestrial ocean basins, there seems to be no firm reason to believe that the ocean basins are *caused* by the oceans, and we are not able to conclude that Mars once had oceans in its earlier history, a conclusion which would have had profound implications for the possibility of the origin of life on primitive Mars. By terrestrial analogy, the presence of ridge systems on Mars suggests some contemporary tectonic activity on the planet.

The possible existence of differences in elevation of 10 to 15 kilometers on Mars bears on the problem of Martian atmospheric pressures. The *Mariner IV* radio occultation experiment gave a surface pressure on Mars of some five or six millibars (mb); infrared spectrometric observations of Mars obtained from the Earth give pressures in the 10-15 mb range. Although there has been some effort by both sets of observers to



No evidence of life on Earth, intelligent or otherwise, appears in this Nimbus photograph of the planet with ground resolution of a few kilometers, somewhat better than the best resolution of Mars obtained in the *Mariner IV* photographic sequence.

stretch their probable errors to achieve concordance, the difference between their results is probably significant. An occultation experiment is necessarily biased towards highlands, and if an elevation exists somewhere near the nominal tangency point of the radio beam to the planet, it is the pressure above the elevation and not the pressure above the mean "sea level" which will be measured. An infrared spectrum, on the other hand, measures pressures averaged over bright and dark areas.

The occultation observations were in fact made close to dark areas, and it seems very plausible that the occultation pressures refer not to the mean Martian surface, but rather to highlands. The difference in pressures between occultation and infrared results then gives an elevation difference between bright and dark areas consistent with those previously obtained from radar observations. The pressures predicted in the centers of bright areas are then in the 15-20 mb range, high enough for the efficient use of parachutes in Martian landers. The pressures above the dark areas are expected to be smaller, and landing spacecraft by para-

chute in Martian highlands will be hazardous.

Life on Mars: Still an Unsolved Question

It thus appears that the four "classic" lines of evidence for life on Mars—the green coloration, the seasonal and secular changes and the canals—can be understood in other terms. Of course this is very different from saying that life on Mars does not exist. It is quite striking that were the tables turned, with us on Mars (with the same degree of astronomical sophistication as we currently have on Earth), we would experience the greatest difficulty in detecting any sign of life on Earth by optical means. Photographs of Earth with better resolution than the best photographs that we now have of Mars from *Mariner IV* show no sign of life, intelligent or otherwise, on our planet. Seasonal and secular changes, due for example to the harvesting of crops, deciduous forests and algal blooms, would be difficult to detect and would likely be satisfied by alternative models. Terrestrial radio, television and radar transmission could be detected from Mars, but only during the last few decades. During the previous several billions of years of Earth history, it would have been virtually impossible to detect life from the vantage point of Mars.

To decide rigorously about life on Mars therefore requires us to approach the planet more closely. One of the most promising possibilities is a planetary orbiter—which would observe the planet over a period of some months, looking closely at the seasonal and secular changes, for hot spots and locales of increased moisture, and photographing the surface with vastly improved resolution. Photographs taken of the Earth with a resolution of some tens of meters could detect intelligent life on our planet. With a resolution of a few meters individual organisms could be detected.

The ultimate test will be the landing on Mars of an unmanned scientific laboratory capable of performing a programmed array of biological and physical experiments on samples extracted from the surface. Such devices, once pure figments of the imagination, are now under active development in the *Mariner* and *Voyager* programs of unmanned spacecraft in the United States, and in comparable programs in the Soviet Union. Within the next decade, we should have the beginnings of systematic, rigorous and firsthand evidence on the nature of the planet Mars. ■



Carl Sagan is assistant professor of astronomy at Harvard University and a staff member of the Smithsonian Astrophysical Observatory. His primary scientific interests are in the physics and biology of the planets. Dr. Sagan is a consultant to various groups of NASA and the National Academy of Sciences, as well as to M.I.T.'s Instrumentation Laboratory. He is coauthor of the recent book *Intelligent Life in the Universe*.

The Conscience of the Engineer

Professors at schools like M.I.T., Caltech and Illinois Institute of Technology have acknowledged standards of excellence, but not comparable standards of relevance. They see only the benefits of engineering, without recognizing its possible antisocial effects.

This scathing attack came from Ralph Nader, the lawyer who wrote *Unsafe at Any Speed* and who has spearheaded the attack against the lax safety standards of automobile manufacturers. He was speaking on "The Engineer in Society: His Responsibilities and Ethics" in a program sponsored by the M.I.T. student section of the American Society of Mechanical Engineers.

It is important, said Mr. Nader, for the engineer to see and forestall possible crises resulting from technology, rather than waiting for disaster to highlight the problems. This, indeed, is one aspect of engineering competence, and it is just as creative a challenge to the engineer as the original technology.

The engineer comes under the influence of three environments in pursuing his profession—the university, the corporation and the professional society. All three, according to Mr. Nader, are failing to provide the atmosphere in which the engineer can exercise his conscience without fear of reprisals.

Mr. Nader first became interested in auto safety when he was a student at Harvard Law School. At that time he visited the engineering schools at Harvard and M.I.T., and was amazed to find that no one there was very interested in the subject. And today engineering schools still seem to avoid the problem entirely, he said; most of the work on auto safety is carried out in schools of public health and medical schools.

This lack of concern by the engineering schools for social issues extends beyond this particular problem, Mr. Nader commented. Indeed, he said, they have shown little tendency to identify and attack social problems with a high engineering content, such as air pollution and pipeline safety. The universities, he felt, have the obligation to produce relevant knowledge of human problems, and to spread this knowledge in the quarters in which it will have most effect.

M.I.T. is particularly guilty of failing to exert more influence on the problem of auto safety, Mr. Nader said. The Institute has excellent channels of communication with General Motors, for example, through its ownership of millions of dollars worth of stocks, through alumni, and through other more formal channels. These connections offer great opportunities for two-way flow of information between the two bodies; at the moment, however, the flow is predominantly one-way—from G.M. to M.I.T.

The corporate environment came in for strong criticism from Mr. Nader. Some organizations have become new tyrannies; engineers are becoming well-paid servomechanisms of the corporate machine, often without realizing it. In the auto industry, the corporate environment has four consequences: intolerable secrecy, authoritarianism of the stylist over the engineer, lack of R and D funds for safety research, and perpetuation of the doctrine that the customer should be kept ignorant of

safety factors.

The engineer who protests about these attitudes and tries to use individual initiative is subjected to restraints within the organization which are subtle but nonetheless very real, Mr. Nader continued. He reported to his audience about anonymous letters he had received from conscience-stricken engineers who knew of faults on production lines but were unable to get their companies to take any action over them—and afraid of the consequences of publicizing the faults.

The professional engineering societies were also objects of Mr. Nader's contempt. They are better termed manufacturers' associations, he said. Company members organize the societies' programs in such a way as to avoid any criticism. U.S. researchers on auto safety have occasionally had to go abroad for publication of their work. As a result of the company dominance, professional societies are completely failing to speak up for the interests of engineers, and for individuals who come into collision with the large corporations, over matters of integrity.

What are the remedies for this destruction of engineers' consciences by the large corporations? Mr. Nader felt that the universities and professional societies must work together to offset the worst effects of the corporation environment. If they do not, the profession will lose its far-seeing, socially conscious engineers—the very people who can prevent our society from becoming one which reacts to crisis rather than foreseeing it. Inside the corporations, engineers must learn to achieve their ends politically. Above all, society must strive for a framework in which an engineer does not have to be a hero to follow the dictates of his conscience in standing up to his corporation. □

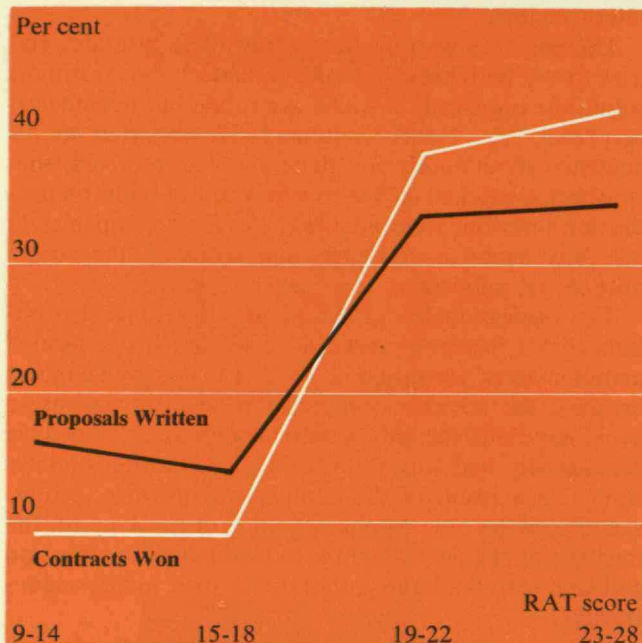
"Under Constant Surveillance"

At least two members of the larger M.I.T. community have key roles in national efforts to make motor vehicles safer: William Haddon, Jr., '49, Administrator of the National Traffic Safety Agency, and Roy C. Haeusler, '32, Head of Chrysler Corporation's automotive safety program.

Though few members of the community may have realized that Dr. Haddon is among their number, Ralph Nader, attorney and author of *Unsafe At Any Speed*, knows. Speaking at M.I.T. this spring (above), Mr. Nader castigated the Institute's indifference to teaching or research on traffic safety problems. Earlier this year, in a paper in the *Journal of Engineering Education*, Mr. Nader accused M.I.T. of maintaining a posture of "aloofness" to Dr. Haddon and of publishing in its journal, *Technology Review*, automotive industry advertisements but no articles on "this great problem confronting engineering."

Dr. Haddon himself, unruffled by his critics from both sides of the argument, has recently told *Medical World News* magazine that the new codes of automobile safety "follow the letter and intent of the law, which requires that our standards be based on existing safety standards, be practical, and that they bear a demonstrable relation to highway safety." The new code, he insists, will mean "substantial progress for the safety of the American people."

"There is no question," Dr. Haddon told *Medical World News*, "that automobile accidents are one of the



Effects of scientific creativity and the ability of leadership to recognize it on scientific performance. Chart at left shows the correlation between scores in the Remote Associates Test (RAT) and performance as measured by proposals for contracts and contracts actually won. Chart above illustrates the differing effects of leaders who can recognize variation in the creativities of men in their teams and those who cannot. Groups led by the latter fail to produce results even though their members have high RAT scores.

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central environmental health problems of our time." And if engineers are shrugging their shoulders, as Mr. Nader claims, so are the doctors. Dr. Haddon finds the apathetic attitude of his colleagues among the nation's physicians one of the most frustrating aspects of his job: "It is about time that members of the medical profession, who regard this as an exotic and nonmedical area, begin to understand its place in their traditional concerns."

Meanwhile, Mr. Haeusler has told *Automotive World* magazine that the next important step in reducing accidents may be better communication. "The need for further communication between drivers has become imperative," he says. Mr. Haeusler is thinking of an extension of turn-signal devices so that they can convey more messages and information; and he is also thinking of two-way radios for various kinds of communication between drivers.

Have there been safety improvements in post-World-War-II cars? Yes, says Mr. Haeusler: increased acceleration, more efficient brakes, increasing glass areas for better visibility. But these are part of a continuing effort, *Automotive World* was told; we need better braking systems for emergency "panic" stops, cleaners for headlamps, still better driver visibility by further reducing his "blind spots." "It may be worthwhile," says Mr. Haeusler, "to entice the driver to actively scan the entire view around him so as to keep the complete traffic scene under constant surveillance." □

Scientists and the Creative Approach

Can administrators select scientific teams guaranteed to produce creative, innovative work? Yes, if they choose the right group leader, according to Professor Gerald Gordon of Cornell University, who this spring gave a Sloan School audience a progress report on his investigations into creativity among scientists.

Professor Gordon started out with the tenet that the creative act in science reflects the ability of one man to achieve an understanding and integration of disparate

scientific events. To put this into quantitative terms, Professor Gordon's group subjected scientists in two organizations—one a Research and Development firm with many defense contracts, the other a large chemical firm—to a Remote Associates Test (RAT). Participants in such a test are asked to give a single word to link apparently unconnected words; for example, the link between water, cheese and blood is the word blue. The RAT scores of scientists the Cornell group tested correlated well with evaluations of the scientists' creativities by their superiors, as reflected in such factors as disproportionate increases in salaries. They also relate well with the number of contract proposals written and contracts won by the scientists (see chart above left).

Assuming, therefore, that administrators have some chance to identify the creative scientists in their organizations, how can they fit them into the proper climate to exploit their talent? Today's "big science", with its dominance by machines and emphasis on the large group, can offer the antithesis of the atmosphere that the truly creative scientist demands. But organizational science can use creative talents, Professor Gordon argued, by funneling information from many sources to one central person in each group of scientists; it is the function of this person to integrate the disparate facts presented to him—to provide the creativity for the group. Often this man is the group leader, but this is not essential.

Another factor in organizational science, just as important as creativity, is the ability to recognize this gift. The Cornell group asked a number of group leaders to evaluate the performance of scientists in their teams on a ten point scale, from poor to excellent. An interesting division emerged from these evaluations.

Some of the leaders used all or most of the scale in their evaluations, while others classified all the members of their team into a narrow band, using only one or two numbers. These two groups are termed, respectively, differentiators and nondifferentiators. It appears that the differentiators, who are outnumbered two to one by their opposites, have the ability to spot the creators with high RAT scores in their groups. The nondifferentiators, by contrast, cannot recognize wide differences among their teams' abilities; indeed, when asked for an

opinion they tend to rate their least creative researchers as very creative.

These two classes of leaders have very different effects on their groups. In groups with differentiating leaders, the scientists with high RAT scores tend to rise to the top and be the most productive members. The equivalent scientists in groups led by nondifferentiators perform no better than their less creative colleagues (*see chart near left*).

Professor Gordon stressed the preliminary nature of his research. However, it now appears that scientific administrators have some criteria for selecting well-balanced research teams and the leadership to exploit their abilities to the full. □

Tutorial With a Computer

In ancient times, the children of noblemen received their education from highly trained slaves. In these days of universal education, computers are the equivalents of the slaves of yesteryear; at present these latterday serfs are relatively stupid, but they can soon become well-informed tutors of students of all levels.

Such is the view of Edwin F. Taylor, of M.I.T.'s Education Research Center, which is taking the first steps toward this new concept of slave labor in its ELIZA teaching program. Dr. Taylor gave a progress report on the six-month-old program at the meeting of the Electrical and Electronics Engineers in New York at the end of March.

The program, developed by Joseph Weizenbaum, Associate Professor of Electrical Engineering at M.I.T., enables students to carry out teletyped conversations in natural English (including numbers, symbols and equations) with a large general-purpose computer. ELIZA uses a time-shared computer, and so does not interfere with the use of other terminals for teaching or research. The M.I.T. Computation Center's IBM 7094 computer has filled the dual role of slave and tutor.

As an instructor, the ELIZA program guides the student through a problem selected (by the student) from a number of sub-programs called "scripts." Generally each script is programmed to deal with the three or four most obvious methods of attacking the problem, and allows for wide variation in detail for each method. The student therefore gains the impression that the solution is entirely his own.

Occasionally the computer misunderstands the student's intentions, and takes him down the wrong path for a short while. However, periodic summaries by the computer of what it thinks the student is trying to say can serve to identify such errors. More seriously, the student may sidetrack the computer, either facetiously or unintentionally, to an unprogrammed direction. In these cases the computer can extemporize to some extent, but it can also be programmed to bring the student back to the original topic of discussion. In addition, if it recognizes that the student is not proficient in any particular aspect of the subject, it can call up another script to explain this aspect, meanwhile marking the place in the original program at which the interruption occurred.

In following a student's line of argument, the program uses key words and decomposition rules. Key words provide some idea of what the student is talking about, and decomposition rules allow the machine to investigate the context of the sentences in which the key words



PHOTO: BROADCASTING MAGAZINE

James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation (center, above) led members of the Carnegie Commission on Educational Television (*see Technology Review* for April) in their appearance before the Senate Commerce Committee in Washington early in April to support the Johnson Administration's proposals for public financing of educational television programming. Leonard Woodcock was speaking when this photograph was made.

Jack Gould, television critic writing in *The New York Times*, said that Edwin H. Land, Visiting Institute Professor at M.I.T. who is seated at Dr. Killian's left, above, "started what really should be the central dialogue of the months ahead" in his remarks for the committee.

"All of us who are mature," Dr. Land told the committee, "feel that the historic principles of behavior and morality—of things that we believe in—are being lost, not because young people cannot believe in them but because there is no language for translating them into contemporary terms.

"The search for the ways to tell young people what we know as we grow older—the permanent, wonderful things about life—will be one of the great functions of this noncommercial system.

"Many of us have dedicated our lives, not to making an academic world that is far-out and remote, but to the conviction that we have in the emerging American culture, an intelligence and urgency, a need for inner discovery such as never existed in history before. . . . Do not think of educational television as a dry and dead thing, but the very source of making the country what each of you would most like to have."

Commenting on Dr. Land's testimony, Mr. Gould wrote, "To begin with the sparkle that a child shows and then nurture that interest into a viable continuity between generations might well be the enduring guideline for fruitful communication with the home."

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appear, and hence discover what the student is saying about them.

The need for a reasonable limit on the number of key words and decomposition rules in any program causes one of the main drawbacks of the system in its present form: although it gives the student a lot of leeway to develop his own arguments and solutions, it is still pushing him down narrow corridors of logic. Even when he opens one of the doors leading from the corridor (when, for example, the program calls up another script) he merely moves into another corridor.

A second difficulty in the ELIZA program is the sheer time required to produce scripts. Even an experienced programmer takes an hour to write an amount of script that will engage the student for just one minute. However, Dr. Taylor believes that this can be cut to half the present time or less using methods already available.

In spite of these problems, Dr. Taylor noted, "ELIZA is a significant step down the long road toward the goal of freely-structured discussion." So far no attempt has been made to use the program with students on a formal basis. But Dr. Taylor told *Technology Review* that the Education Research Center is preparing one portion of an introductory course in relativity for presentation using the computer. Thus material will be evaluated by faculty members and volunteer students in order to judge the usefulness of this mode of teaching. □

Nuclear Proliferation for Peace

America's hope of limiting the spread of nuclear power and reducing the threat of nuclear war through an international nonproliferation treaty is called dangerous and unrealistic by Edward Teller, professor-at-large at the University of California.

Nuclear proliferation is unavoidable in today's world, Dr. Teller told M.I.T. alumni at the annual East Bay meeting of the M.I.T. Club of Northern California. The example of China makes it clear that relatively little-advanced countries can develop nuclear weapons and rockets with which to deliver them; "What the Chinese can do very many other countries can also accomplish," Dr. Teller said. And, he added, the growing use of nuclear energy for producing electrical power assures the spread of nuclear fuels to many countries where it is needed for power generation. From the availability of fuel to its application in explosives is a short step, easily accomplished by any nation.

So, said Dr. Teller, there is "very little doubt" that proliferation will occur, and it will make the world "more dangerous, more complicated, less predictable, more filled with unknown risks."

The history of treaties does not give Dr. Teller much assurance that a nonproliferation treaty can indeed end the spread of nuclear arms. It may simply have the effect of tying our hands, of forbidding the U.S. from "helping our allies defend themselves because no nuclear explosive will be permitted to leave our country, whether intended for aggression or defense."

Instead, Dr. Teller proposes that the U.S. deliberately extend an anti-missile umbrella in the form of nuclear defensive weapons, making them more widely available

to our allies. With this kind of help, he believes, the entire free world can have increasing assurance of a true defense against enemy missiles—not a defense based upon retaliatory ability so strong that it can survive the first wave of any nuclear attack.

Dr. Teller's proposal is that nuclear explosives be deployed as missile warheads among all the United States' allies. Defensive missiles deployed by our allies could then carry these warheads aloft in case of attack to unleash high-altitude nuclear explosions which would destroy enemy missiles.

The important point, he emphasized, is that conditions of electronic programming can now be maintained which assure that U.S.-supplied warheads could be used only against enemy missiles within the space of the recipient nation, that they could not be disassembled and used for any other purpose. "It is now possible," he told the San Francisco area alumni, "to make a warhead which will destroy itself if you try to misuse it."

"I believe in treaties with a little skepticism," Dr. Teller said. "But I do believe in treaties which are backed up by electronics. And I see great potentialities in this type of defense, which is indeed defense in the strictest sense of the word and therefore a powerful force for peace." □

CTAB and the Automobile

Automotive transportation is the latest in a series of technological headaches under scrutiny by the Commerce Technical Advisory Board, and whatever role the electric auto plays in America's future, two CTAB principals will be identified as having key roles.

The two are J. Herbert Hollomon, '40, Assistant Secretary for Science and Technology of the Department of Commerce who is now Acting Under-secretary of the Department, and Richard S. Morse, '33, Charter Member of CTAB who is now Chairman of its Panel on Electrically Powered Vehicles.

In a sense, CTAB, of which Dr. Hollomon is founder and chairman, is a prototype of government boards which bring government and nongovernment talents to bear on prime national problems. It operates chiefly through panels set up to study specific technological problems. The latest CTAB panel report was on research and development for high-speed ground transportation, in which a number of M.I.T. faculty had leading roles, and that report will probably be the basis for much of the research effort of the new Department of Transportation.

The next panel report will be on federal programs to stimulate commerce and industry; Richard S. Leghorn, '39, is its chairman. The report of CTAB's Patents Panel led to administrative improvements in Patent Office procedures, to a Presidential commission on the patent system, and—indirectly, through the commission—to the changes in U.S. patent law which are now before the Congress. The recommendations of the Engineering and Commodity Standards Panel (the LaQue Report) led to a new private body, the U.S. Standards Institute. CTAB's Telecommunications Panel identified "the silent crisis" facing the communications world, the overcrowding of the electromagnetic spectrum; it suggested the establishment of a new research organization which would embrace all spectrum users.

(Continued on page 38)



PHOTO: DAVID STANDLEY (M.D.P.H.)

Though the picture belies it, Boston air is "surprisingly clean," David Standley, Associate Air Pollution Control Engineer in the Massachusetts Department of Public Health, told an M.I.T. air pollution seminar this spring. Mr. Standley's office has just completed an intensive 14-month survey of air pollution in Greater Boston, including a limited source inventory; he says the preliminary results, to be released later this month, will show that Boston's situation has not deteriorated much in the six years since 1960 when useful records became available. The photograph above was made from a Department of Public Health airplane approaching Boston from the north; it shows M.I.T.'s Green Building (extreme right), the Prudential Center (right), Boston landmarks (center), and the Blue Hills (far right distance) protruding through a windblown pollution layer during Thanksgiving Week, 1966, when Boston—along with the rest of the East Coast—experienced record pollution levels. In general, Mr. Standley said, the air reaching Boston from the west is quite clean, and this—rather than Boston's smokeless furnaces—helps give the area its good record.



Three principals in the Department of Commerce's successful Technical Advisory Board: J. Herbert Hollomon, '40, Chairman of the Board who is now Acting Under-secretary of the Department of Commerce; Reuben Pomerantz, '53, Staff Director of the Board; and Richard S. Morse, '33, a Charter Member of CTAB who is chairman of its automobile panel and a lecturer in the M.I.T. Sloan School of Management.

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CTAB itself meets twice a month. Its assignment is to oversee the technical operations of the Department of Commerce, to advise on ways to stimulate research and development to promote economic growth, and to conduct studies of urgent national technological problems. Dr. Hollomon was CTAB's founder, and to him Dr. Morse credits most of its success: "I have been on a large number of government studies for the past 20 years, but Dr. Hollomon's technique for using a committee is in itself an innovative management procedure which I think is well worth study by other government and business organizations. In addition to the leadership of Dr. Hollomon," says Dr. Morse, "the success of the panel results from its diversified members, all of whom are both outspoken and without any particular ax to grind."

CTAB's newest panel, called the Panel on Electrically Powered Vehicles (its report is bound to be called the Electric Car or Morse Report) but actually undertaking a much broader survey, was established on January 6 and is due to report by this fall. Its 16 members represent a variety of viewpoints, there are 40 other experts on its sub-panels, and it has virtually government-wide official support with many agencies—Departments of Health, Education and Welfare, Transportation, Defense, Housing and Urban Development, Post Office, and Interior, Atomic Energy Commission, Federal Power Commission, and others—cooperating to the extent of supplying both funding and staff.

"The panel is not limiting its study to any particular type of automotive propulsion," Dr. Morse has said. "It is looking into fuel cells, batteries, turbines, steam engines, and other nonconventional devices and systems as well as the internal combustion gasoline engine. We

also have established sub-panels to concentrate on air pollution, energy sources, cost analysis, transportation system requirements, and energy storage and conversion systems."

The fascinating feature of his panel's assignment, Dr. Morse has told Bruce Davidson, financial editor of the *Boston Globe*, is that the group is not only free to look at all aspects of the problem—such freedom is actually their assignment.

The electric car study is to make formal consideration of all these questions: air pollution, automobile costs, automobile energy sources, energy storage and conversion, current and improved conventional auto systems, economic impact, and overall transportation system requirements. Typically, the panel so far has been listening to presentations from the major automobile manufacturers, battery experts, pollution specialists, and government departments with an interest.

At recent public Congressional hearings on the electric car held by Senators Edmund Muskie and Warren Magnuson, several Johnson administration officials admitted they hadn't reached any final conclusions on the role of the car in the future and wanted to wait for CTAB's report. Alan S. Boyd, Secretary of the Department of Transportation, is opposed to federal involvement in electric car research at this time and Dr. Hollomon agrees, although he thinks there might be a way to reward imaginative companies by buying their electric vehicles for such government uses as defense and the postal service. □

The Next Directions in Space

What lies beyond Apollo?

Speakers at the American Astronautical Society symposium at New Mexico State University late this March wanted to define and start work at once on the nation's post-Apollo space program. The momentum of the massive buildup in equipment, facilities, industrial base and manpower of the Apollo mission, said R. L. Sohn of TRW Systems, "will be lost unless it is applied to some new goals within the near future."

Three kinds of post-Apollo space missions were discussed. Maxwell W. Hunter 2d, '44, of Lockheed Missiles and Space Company, was both reassuring about the possibility and persuasive about the importance of unmanned planetary missions.

"The outer reaches of the solar system," he said, "are not really so technically distant as most people believe. With proper design and skillful utilization, the whole of our solar system is accessible with rather remarkably small amounts of modern technical equipment."

Mr. Hunter's optimism was based on his data showing that all the planets can be reached by unmanned probes with minimum launch velocities of less than 16 km/sec, which compares with earth launch velocities of 11 km/sec for lunar missions.

For example, Mr. Hunter said, the minimum-energy flight to Uranus requires a launch velocity of 15.85 km/sec and takes 16.1 years (or four years with a launch velocity of 19.2 km/sec). Venus requires only 11.5 km/sec launch velocity, Mercury 14.2.

Mr. Hunter argued that such relatively modest space efforts have special importance. When space missions are so expensive that they represent "a national commitment," he said, the traditional freedom of the scientific



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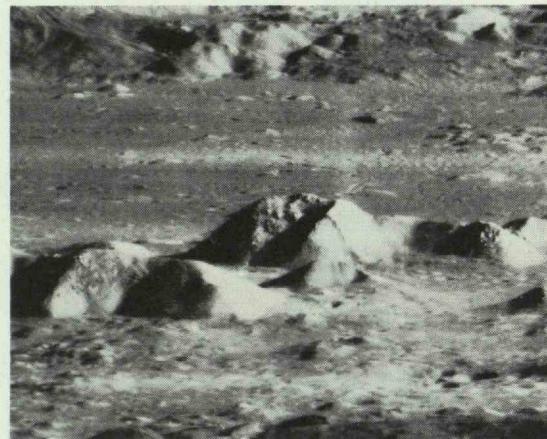
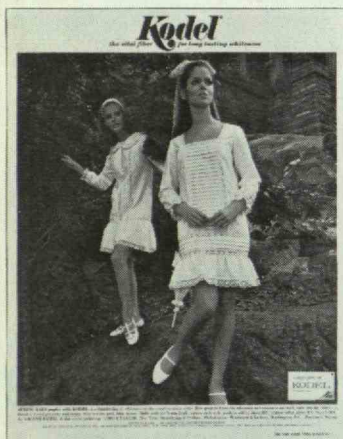
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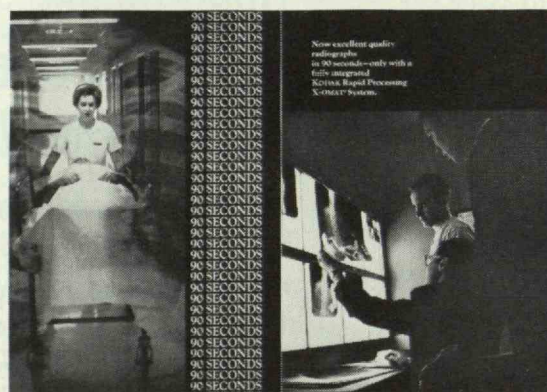
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Trend of Affairs

investigator to pursue data in whatever direction he believes most fruitful is in jeopardy and scientific experiments are necessarily selected by large committees. Mr. Hunter wants to maintain a program of modest space missions so that "scientific inquisitiveness can be decoupled from national programming decisions."

Manned earth orbital flights will also be an important part of our national space program during and after the Apollo period, said William H. Clohessy of the Martin Company. As our population increases and our demands for resources grow, our survival "probably depends upon understanding and cataloging the dynamics of the earth's resources," he said, and manned spacecraft will be our most effective observation posts for such an effort. Later orbiting laboratories will substitute for individual manned spacecraft, and unmanned earth orbiters will take over most of the data-gathering.

The most extensive post-Apollo plans were discussed by Dr. Sohn, who said he felt sure that if the space program can make an efficient transition from the Saturn-Apollo applications programs, "a decision to go to the planets will be forthcoming." The purpose, he said, will be study of the nature of life, if it in fact exists elsewhere in the solar system, to study the origin, evolution and destiny of the universe, and to learn the physical conditions on other planets and the dynamic relationships between the sun and the planets which shape their environments. Manned missions, he said, seem necessary to fully explore these questions and "particularly to establish the existence and nature of extraterrestrial life." □

Stargazing by Holography

Optical elements based on the principles of holography could eventually lead to giant astronomical mirrors of very fine resolution and a practical form of movies in three dimensions without the need for special glasses. The audience at a recent M.I.T. seminar heard this forecast from Professor Dennis Gabor of Imperial College, London, the originator of this exciting new branch of optics.

Holography is the technique of freezing light waves from an object onto a photographic plate, using another source of light known as a "reference beam." On illumination by the reference beam, the plate yields up all the information carried by the original object, including its three-dimensional appearance (see "Recent Advances in Holography," Technology Review, May, 1967). Professor Gabor invented holography as long ago as 1948, but only in the last three years has it become truly practical, through the impact of the laser.

Attainment of Professor Gabor's futuristic forecasts depends on the improvement of Lippmann-Bragg hologram plates. These specialized plates, which reflect light in an analogous way to the diffraction of x-rays by crystals, are more complex than the normal photographic plates used to record holograms, although they derive from the same basic principles.

Professor Gabor has previously pointed out that these plates, which produce images in full color even when illuminated by ordinary white light instead of lasers,

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Trend of Affairs

could form the bases of holographic optical elements free from all aberrations; such elements would have obvious advantages over present-day optical devices. For a high-resolution astronomical telescope, a cylindrical mirror of this type could be placed in the side of a hollowed-out valley, Professor Gabor told his audience.

In producing three-dimensional cinema, it will be necessary to introduce two zones in front of each viewer—one to be viewed with the left eye, the other with the right—to enable him to build up a true stereoscopic picture. Obviously one must take account of the possibility that the viewer will move his head while looking at the screen. However, this could be overcome using a lens in front of the screen consisting of specially shaped Lippmann-Bragg hologram plates. Thus both astronomers and the general public may eventually be able to indulge in stargazing through advances in holography. □

The "Cocktail Party Effect," etc.

The human organism is a very resilient one, and current levels of "noise pollution" do not present a serious hazard to most Americans. Indeed, though noise is increasingly intruding upon modern man's environment, some of the most important noise sources are yielding to controls which promise that they will contribute less, not more, noise in the future.

Newspapermen who expected to hear impassioned cries of alarm went away disappointed from an American Institute of Physics press briefing in connection with the April national meeting of the Acoustical Society of America in New York City.

Sound threatens human health and happiness in three ways, said Dr. Hallowell Davis of the Washington University (St. Louis) School of Medicine. Intense sounds can cause physical injury to the ear, and this problem is relatively well understood. A good deal less is known about the way increasing noise levels may threaten interference with such vital physiological and physical processes as talking, thinking, or sleeping; indeed, the effects seem to vary widely with individuals and there is no adequate quantitative information. And the psychological effect of annoying noise is still harder to study and evaluate, said Dr. Davis. Clearly, he said, the results depend upon the sound intensity, its frequency spectrum, the nature and extent of the individual's exposure, and the individual himself.

Noise is omnipresent in the modern urban environment, and its sources are not easy to pinpoint. Motor vehicles—and especially trucks—are the most prominent, with aircraft a close second. Laymon Miller of the Cambridge consulting firm of Bolt, Beranek and Newman noted the contribution to environmental noise from air conditioning plants and cooling towers placed on the tops of buildings. But how much of these various noises can be tolerated by humans depends upon where they are and what they are trying to do. There is, for instance, said Dr. Miller, the "cocktail party effect"—if serious communication of detailed information is not required, speech can be understood even if the background noise is actually louder than the speech.

The contribution of aircraft to urban noise may soon

be considerably reduced, John Large of the Boeing Aircraft Co. told the briefing session. Sound absorbing techniques which have been developed in anticipation of the large jet engines for supersonic aircraft will soon—although with some difficulties—be applied to the smaller engines of today's jets, and as a result all jet aircraft will soon be quieter. And, as far as engine noise on landing and take-off is concerned, the supersonic jet engines will be no noisier than the jets of today, though the sound will spread over somewhat larger areas.

The sonic boom associated with supersonic flight is not technically noise, because the peak energies are in the vicinity of 10 cps and vibrations of this kind are felt, not heard. Research continues, Mr. Large said, to determine the sonic boom intensities associated with various aircraft and various maneuvers. Already, said Mr. Large, the Boeing Company has spent nearly \$40 million on noise problems associated with jet aircraft, and the work continues.

Whether "noise pollution" can ever be well enough defined so that it may be regulated by the government remains to be seen. But spectacular contributors to the noise environment—such as jet aircraft and certain industrial activities—are under active government investigation. Two results were outlined by Nicholas E. Golovin of the Office of Science and Technology: there is now available a "generally accepted method of assessing human reaction to aircraft noise," he said; and it is now agreed that "certification of aircraft must be based on noise criteria as well as considerations of safety." □

The "Brain Drain:" American Breast-Beating?

What Minnesota Senator Walter Mondale referred to as the "brain drain backlash" swept over much of a two-day conference on the international flow of manpower held at the University of Minnesota in mid-April. Most of the eight featured speakers and many of the discussants took pains to emphasize that the so-called "brain drain" was either exaggerated or distorted or, in any event, not really the concern of the American government.

Charles A. Myers, Professor of Industrial Relations at M.I.T., set the tone as the opening speaker. He argued that, while "investment in higher education is needed to meet the requirements of developing countries for high-level manpower, there can be too much investment in higher education relative to other levels of education." Many people do not benefit from a college-level education, he said, so their secondary education should be aimed at "prevocational or vocational training geared to employer needs, or followed by subprofessional training in a technical institute."

Nigeria is a case in point. Professor Myers quoted a onetime collaborator of his, Frederick Harbison, to say that Nigeria's five universities are already "beginning to turn out more nontechnical graduates than the country really needs, whereas it fails to produce enough scientists, engineers and doctors primarily because the secondary schools are unable to provide enough students with adequate mathematical and science backgrounds."

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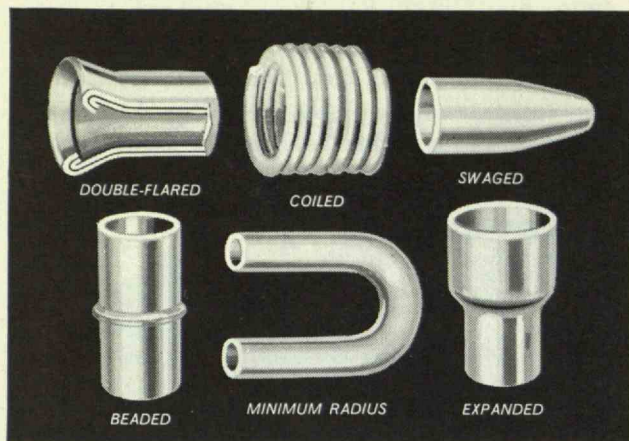


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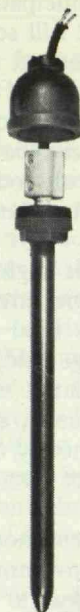
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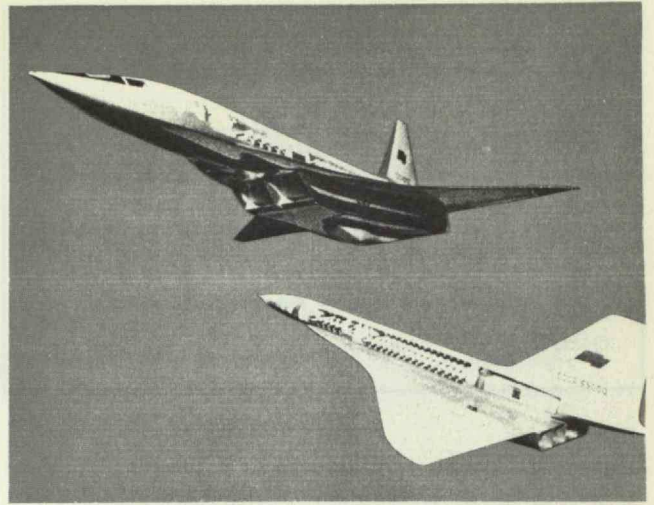
Trend of Affairs

Professor Myers divided nations into four stages of development. In the most underdeveloped ones, the proportion of students enrolled in scientific and technical subjects should be increased, but more than half should be enrolled in subprofessional, technician or nondegree courses. An appropriate strategy for level two and level three (semi-advanced) countries would be to increase enrollment in agricultural, scientific and engineering courses while restricting or reducing other enrollments.

Even when nations reach the fourth, or advanced, stage, he suggested, their investment in science and technology should be increased.

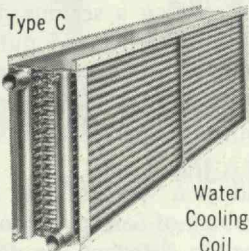
The second speaker, Francis X. Sutton of the Ford Foundation, also questioned the appropriateness of much of the education foreign students are receiving, whether in the U.S. or at home; but he added that "a strong emphasis on applied science and practical training is no sure formula for producing the kind of effective graduates who are needed. It is attitudes and motivation that must be affected, and for this task, the spirit and morale of institutions of higher education seem much more important."

Another Ford Foundation official, F. Champion Ward, Vice-president, in perhaps the boldest statement of the conference, called for a "universalism" in the education foreign students receive in the United States

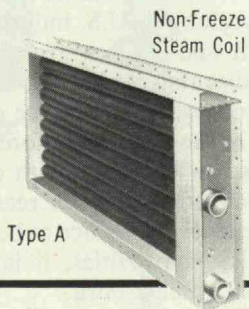


Models of the Soviet Union's TU-144 supersonic transport airliner, shown recently at a seminar in M.I.T.'s Department of Aeronautics and Astronautics by Secor D. Browne, Assistant Professor of Flight Transportation and of Russian at M.I.T. In the opinion of Russian aeronautical experts to whom Professor Browne has talked, this SST will fly either before the end of this year or before the Concorde's first flight (in February next year). But Professor Browne believes that there will be a long lag between the first flight of the airliner and its first passenger trip—perhaps as much as six years.

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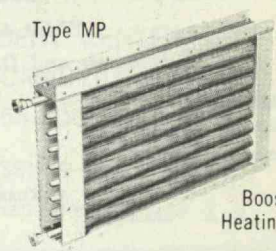


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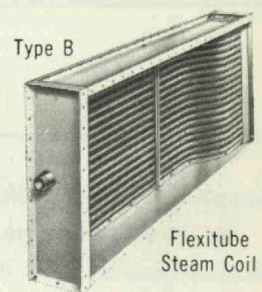
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Trend of Affairs

rather than the pluralism leading to ethnic diversity that is now practiced. As long as he confined himself to questioning the "extraordinary amount of time and money" that nations spend in explaining their ways of life to each other, Mr. Ward seemed on safe ground. But by a leap in logic, he equated universalism with democracy in these words:

"At bottom, democracy is not a tribal ideology. Like science and technology, democracy is a universal principle claiming to be valid for all men and extending to all men the 'blessings of liberty' and the 'imprescriptible rights of the human person.' Since it cannot stop short at the boundaries of a single race or nation, it cannot accept any final, essential diversity among human groups."

The implication of this idea for international education, he said, is that foreign students are not merely "trainees" or "cultural missions" with their own special problems. "Any university graduate anywhere should belong to a world elite whose members recognize each other, not as belonging to a power group and not as bounded by separate national cultures, but as individual men and women whose minds and tastes have been rendered inclusive and versatile during their education."

James M. Davis of the Institute of International Education said that only 9.3 per cent of 323,000 immigrants to America during fiscal 1966 were professional or technical workers, and only one-sixth of that 9.3 figure—in short, about 5,000 persons—were temporary visitors who adjusted their status and remained in America. "We Americans beat our breasts excessively," he concluded.

One of the Friday speakers, Paul Miller of the U. S. Department of Health, Education and Welfare, had some corroborative figures. He said the State Department had recently asked 80 developing nations if they thought the United States was causing a serious drain on their manpower. Of the 60 who replied, 45 did not regard it as a problem. However, the highest percentage of nonreturnees lies in the scientific, medical and health professions, with up to one-fourth of these students remaining here.

Engineering, Mr. Miller said, is a "professional field that seems to induce large numbers of foreign nationals to remain in the United States. In a recent sample of 195 engineers who received doctoral degrees at Purdue University and who are now working in U.S. industries, 26 per cent were foreign-born and 20 per cent completed their undergraduate studies outside the U.S. It is important to note also that about one-fourth of the doctorates granted in engineering in the U.S. go to foreign-born students. Probably only a few engineers with doctorates return to practice in their homeland, for reasons which one suspects relate to the level of practice at home. On engineering faculties in U.S. universities, it is not uncommon for 10 per cent to be foreign-born."

Mr. Miller also touched on a delicate problem alluded to by several other speakers, including Minnesota Congressman Albert Quie and O. Meredith Wilson, President of the University of Minnesota: how to control "the work patterns, habits and choices of human beings without imposing totalitarian controls over per-

sonal choices and job mobility."

Senator Mondale, who alone of the principal speakers appeared to keep the "brain drain" faith, said he also valued "the free movement of individuals between nations," but added that "this is not an unqualified freedom." Senator Mondale called the "brain drain" from developing nations a "potential catastrophe" because "a talented professional or student is more than mere manpower in a developing country. He is a leader, or a potential leader, in his nation's upward movement from colonial subservience to full participation in the world community." Too much can be made of numbers when discussing this issue. "Only 16 Nigerian doctors were working in American hospitals in 1963," he said, but "to a Nigerian, it means that nearly a year's production of doctors from that nation's single medical school have left the country."

He suggested wider use of the exchange visitor visa, which would require foreign students to return home for at least two years before becoming eligible to return here. Nor, he said, must we discard the possibility of carefully conceived changes in immigration law. "There seems little doubt," he said, "that the Immigration Act of 1965 has brought a substantial increase in the talent drain from some of the Asian countries which can least afford it. . . .

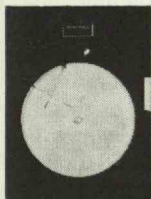
"These millions of people will not find their opportunities in the United States. If they find them at all, it will be at home. And if they find them, it will be because the presence of leaders—of people in the institutions of their societies who can help them move forward."—Robert Lundegaard ■

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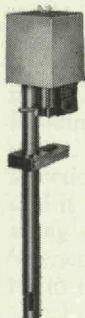
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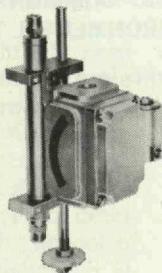
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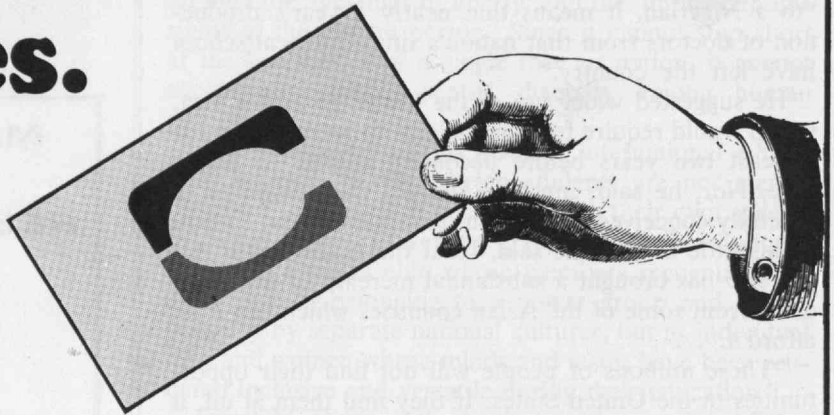
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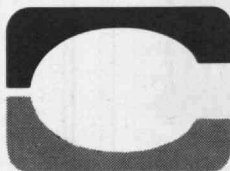
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Dreyfus Grant

Gifts and pledges totaling \$3,000,000 by The Camille and Henry Dreyfus Foundation to strengthen teaching and research in chemistry at M.I.T. have been announced by Mrs. Jean Dreyfus Boissevain, President of the Foundation, and James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation.

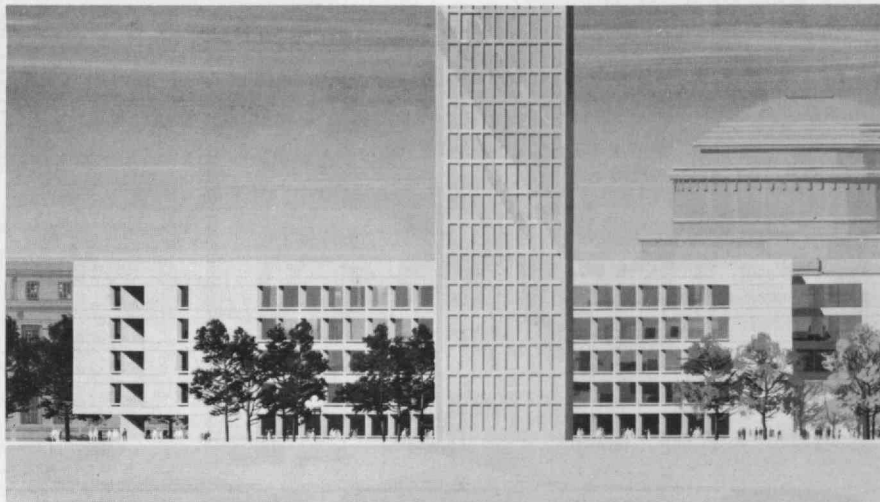
M.I.T. has committed \$7,500,000 to construct and equip a building for the Department of Chemistry and will name it in honor of the late Camille Dreyfus, Dr. Killian said. Additional funds for the building have been provided by a National Science Foundation grant of \$2,946,700 and gifts, grants and pledges from corporations, foundations and alumni.

The program for the strengthening of chemistry also includes new support for faculty endowment and a 10-year maintenance fund for the building. It includes establishment of a Camille Dreyfus Professorship in Chemistry by a \$500,000 gift from the Dreyfus Foundation in 1964. The chair and the new building honor the Swiss-born chemist who, along with his brother, Henry Dreyfus, pioneered in polymer research.

In the M.I.T. announcement, Dr. Killian noted that Dr. Dreyfus' life was "dedicated to excellence and achievement in chemistry." The grant has special significance, he said, because it "represents the interest of a private foundation in a program of national importance which has also received generous support from the Federal government, industrial corporations, foundations and Alumni." Mrs. Boissevain noted that M.I.T.'s new building will help perpetuate Dr. Dreyfus' "spirit of adventure in chemistry," and will "further advance the leadership in science and technology for which the Institute is known throughout the world."

Howard W. Johnson, M.I.T. president, revealed in the same announcement that final design of the Dreyfus Building (by I. M. Pei ('40) and Associates) is being completed and construction will begin during 1967. He said it will be "a major step" in developing new facilities for the School of Science and that its completion "is vital to the department's work as a national center for the education of professional chemists."

The Dreyfus brothers, for whom the building is to be named, worked in Europe in the early 1900's on cellulose acetate research which resulted in cellulose acetate yarn, lacquers, and plastic films. Three major chemical-



The five-story Camille Dreyfus Building for the Department of Chemistry, designed by I. M. Pei ('40) and Associates, is to stand on the East Campus between the Institute's main buildings and the Green Building (earth sciences). It will provide about 135,000 square feet of space for graduate research in inorganic and organic chemistry, and construction will begin during 1967.

industrial enterprises—British Celanese, Ltd., Canadian Celanese, Ltd., and Celanese Corporation—were formed to exploit the results throughout the world. The Dreyfus Foundation is devoted to the advancement of chemistry, chemical engineering, and related sciences for improving human relations and circumstances throughout the world.

The Voices of Protest

M.I.T. students and faculty—a small minority by anyone's count—have raised protest against American Vietnam policy, but the effect has been less than fortissimo.

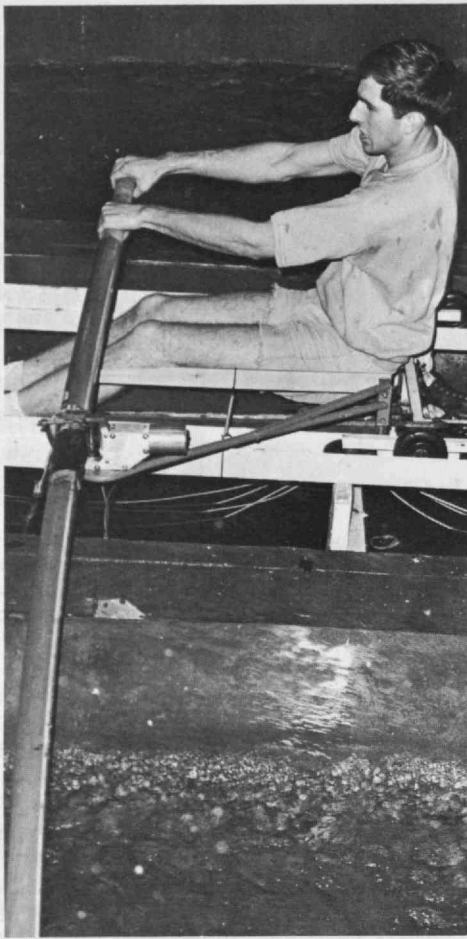
The second week in April was desig-

nated for Vietnam protests by two student groups—Students for a Democratic Society and the M.I.T. Committee to End the War. There were movie showings of Viet Cong and American films throughout the week, and a noon-hour protest rally on the steps of the Student Center attracted upwards of 300, many of them casual passers-by. Those who stayed heard self-conscious speeches linking peace and civil rights, condemning M.I.T.'s role as a "war machine," and claiming that "more bombs have been dropped on Vietnam than were dropped in the entire Second World War." The cacophony of competing loudspeakers and hecklers was continuous.

Though all the signs were anti-war-in-Vietnam, speakers at the April rally on the steps of the Student Center met with sharp taunts from a small (200-300) crowd heavily dotted with those favoring the war. Byron Rushing of the Massachusetts Council on Race and Religion, speaking above, rated special heckling because "his discussion of civil rights rather than the war alienated many organizers of the rally," said *The Tech*.

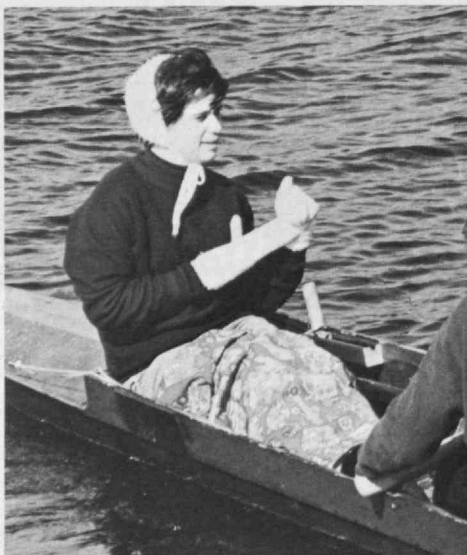
PHOTO: WILLIAM A. INGRAM, '68, FROM THE TECH

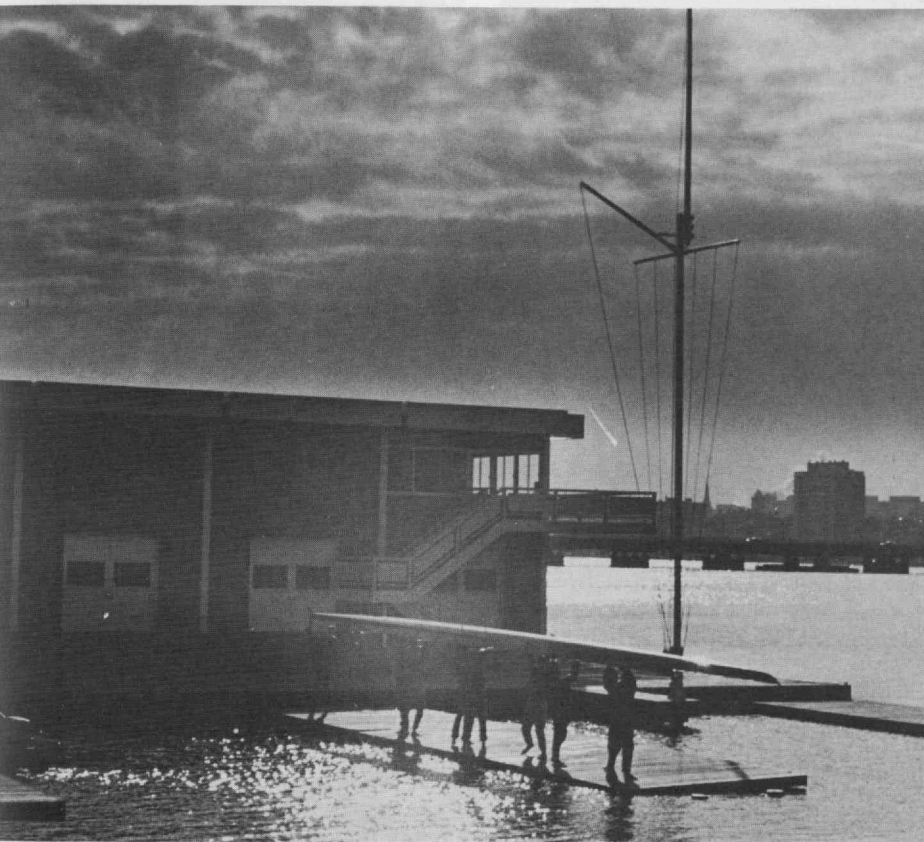




PHOTOS: JEFFREY M. REYNOLDS, '69, AND (ABOVE) ARTHUR A. KALOTKIN, '68, FROM THE TECH

In its first season this spring, the Charles Whitworth Pierce Boathouse has given crew wholly new dimensions at M.I.T. The season began early: oars were bent and faces grimaced (lower right) on the rowing simulator throughout the late winter. When spring finally came, the crews found chilly morning turn-outs enlivened by the co-eds, who formed their own crew under coach David L. Waltz, '65 ("We might win, if we race," he told the *Boston Herald* at the start of the season). The varsity heavyweights started badly with a loss (center, top) to Northeastern and Boston University, but the important races were still ahead.





An Institute Gazette

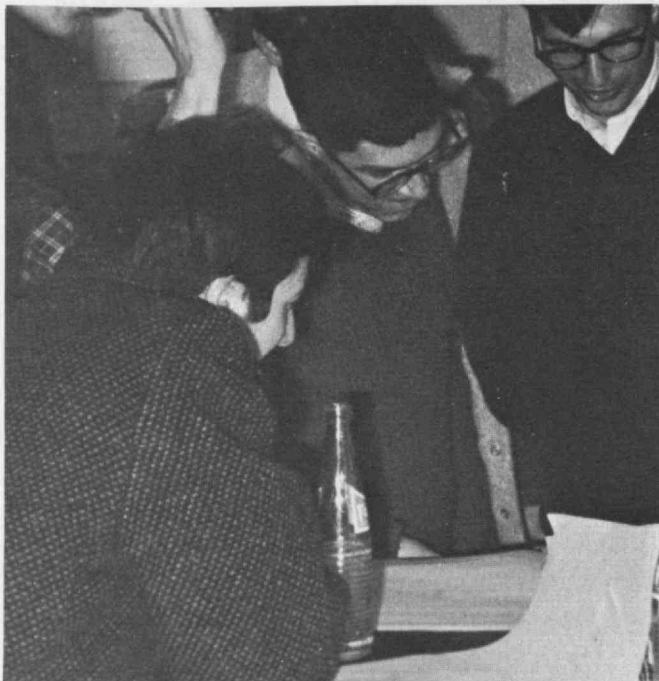
Meanwhile, a more serious protest has been sounded within the Faculty, where A. Noam Chomsky, Ward Professor of Modern Languages and Linguistics, and Louis Kampf, Associate Professor of English, are withholding from the government half of their 1967 income taxes as a gesture symbolizing "a refusal to make a voluntary contribution to the war machine" and "a willingness to take illegal measures to oppose an indecent government," in Professor Chomsky's words. Earlier this year, Professor Chomsky expressed in a special feature in the *New York Review of Books* his concern that too many of today's intellectuals are losing the spirit and fact of freedom. They are reaching a consensus, he said, "by 'accepting society' as it is and promoting the values that are 'being honored' by it." The fallacy (an "absurdity," he said) is "the claim that there are in the social and behavioral sciences certain considerations and principles too deep for the outsider to comprehend."

Professor Chomsky admitted that he is now giving a good deal of his time to a course at M.I.T. on the responsibilities of scientists, a subject he said was "particularly crucial" for M.I.T. students "because of their potential influence and role in decision making." In an exchange of correspondence in the *New York Review*, Professor Chomsky wrote, "As to M.I.T., I think that its involvement in the war effort is tragic and indefensible." But in a still later issue he noted that, "as far as I know, M.I.T. as an institution has no involvement in the war effort"; what he meant, he said, was the involvement of individuals at M.I.T.

AIESEC: Train and Confer

A conference on U.S. housing and urban redevelopment will bring several hundred college students from throughout the world to M.I.T. in July for the annual conference of the Association Internationale des Etudiants en Sciences Economiques et Commerciales.

AIESEC is the international organization of economics and management students, and its principal activity is a program of summer traineeship exchanges which take American students overseas and foreign students to the U.S. for summer jobs. More than 10 M.I.T. students will be working abroad this summer in Nigeria, New Zealand, Switzerland, and elsewhere, and an equal number of foreign students from these countries will be in the Greater Boston area on traineeship



Make-up night at *The Tech*: Mark A. Bolotin, '68, News Editor (center), and Michael L. Rodburg, '68, Editor, work out a problem with kibitzing from an interloper—Philip H. Byer, '70, from *Technique* (left).

An Institute Gazette

jobs which have been arranged for them by the M.I.T. group.

The summer conference comes to M.I.T. this year at the invitation of the local chapter of AIESEC: speakers on the program, which deals with various aspects of urban redevelopment, will include Leonard J. Fein, Assistant Professor of Political Science at M.I.T., Edward J. Logue, Boston Redevelopment Authority Administrator; Carl B. Rechner, Development Consultant for the First Church of Christ Scientist in Boston; John P. Eberhard, '59, Director of Applied Technology at the National Bureau of Standards; Bradbury Seasholes, Director of Political Studies at the Lincoln Filene Center for Citizenship, Tufts University; James A. Feeley, Chief Underwriter for the Federal Housing Administration; Rev. W. Seavey Joyce, S.J., Vice-president of Boston College and President of the Metropolitan Area Planning Council, Bruce P. Hayden, Vice-president of the Connecticut General Life Insurance Co.; James Rouse, President of the Rouse Corp. (builders of Columbia, Virginia); and David S. Mundel, '66, graduate student in political science at M.I.T.

The program, in Kresge Auditorium from July 20 to 23, will be open to the Institute Community. Its expenses are being defrayed in part by Greater Boston companies with an interest in this unique international work-exchange program.

A Daily by 1970?

In the 1880's *The Tech* cost 15 cents a copy; then it went down to a dime, and since 1902 the price has been stable at five cents. At that rate it is one of the biggest bargains on the campus, for *The Tech* has now achieved a level of effectiveness and responsibility in reporting M.I.T. affairs which make it literally a local necessity.

The Tech is an independent enterprise which sets its own standards, plans its own policies, and pays its own bills, and it is one of the largest student enterprises on the campus. Its staff numbers nearly 100, and its annual in-flow out-flow budget is approaching \$40,000 a year.

Today's *The Tech* publishes twice weekly—Tuesdays and Fridays—during the term. Make-up night (Sunday for Tuesday, Wednesday for Friday) brings the staff together: the Advertising Editor reports his success and he and the Business Manager, on this basis, determine a financially feasible size for the issue (usually 12 pages, sometimes eight and sometimes as

A News Quiz by *The Tech*

For its booth at the annual Alpha Phi Omega carnival (see page 56), *The Tech* handed out (for 10 cents) a news quiz—25 questions about M.I.T. affairs on which a careful reader of *The Tech* could score 100%. A careful reader of Institute Gazette in

Technology Review could have answered nine of *The Tech's* questions—not bad coverage of M.I.T. affairs, considering Technology Review's monthly status. How many of the nine can you answer? (Correct answers on page 67.)

1. President Eduardo Frei Montalvo was forbidden by his country to sojourn in the United States and address M.I.T. His country is:

- ☐ Brazil. ☐ Argentina. ☐ Chile. ☐ Cuba. ☐ Colombia.

2. Which of the following teams did not have a winning season?

- ☐ Fencing. ☐ Wrestling. ☐ Swimming. ☐ Basketball.

3. All of the following spoke at President Johnson's inauguration except:

- ☐ Nathan Pusey. ☐ Pierre Agrain. ☐ Theodore Mangelsdorf.
☐ Elting Morrison. ☐ Jerome Wiesner.

4. Among the new appointments in September were two new department heads. They were:

- ☐ Louis Smullin and Victor Weisskopf. ☐ Louis Smullin and Warren Ambrose.
☐ Warren Ambrose and Victor Weisskopf.
☐ William Buechner and Louis Smullin.

5. Of the several significant changes affecting students directly this year, which of the following did *not* take place:

- ☐ Longer parietal hours. ☐ Senior pass-fail. ☐ Longer reading period.
☐ Elimination of liquor restrictions.

6. Which M.I.T. professor's suit led to the successful invalidation of the Massachusetts loyalty-oath-for-teachers law?

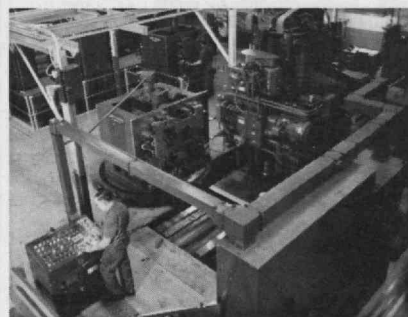
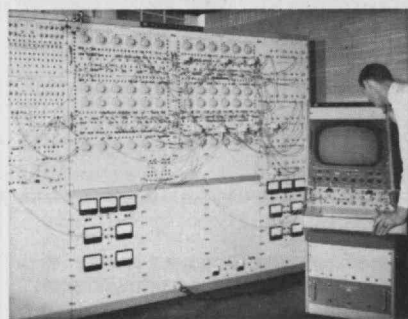
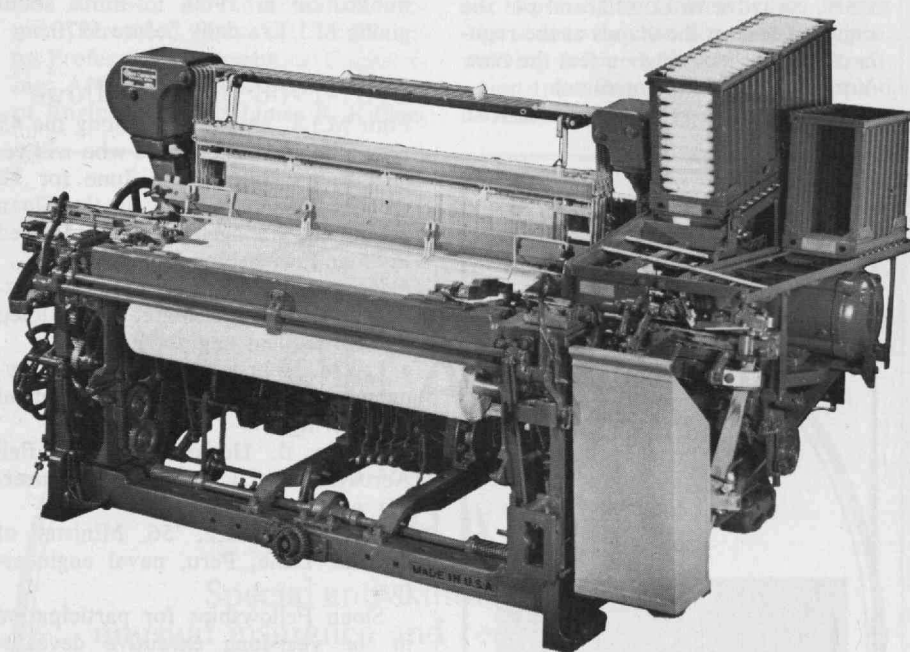
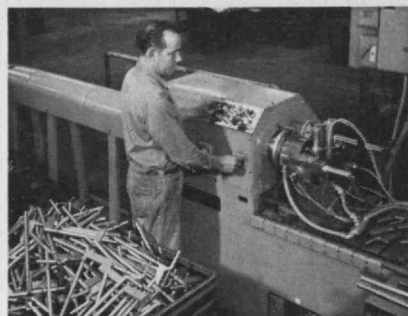
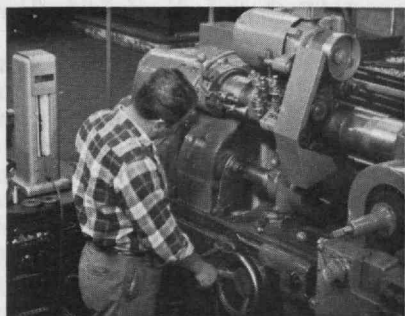
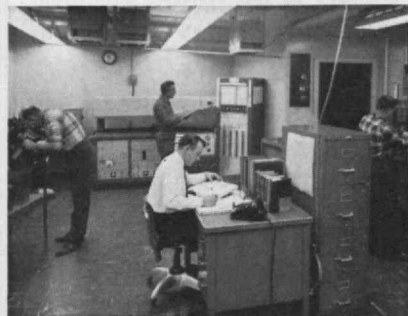
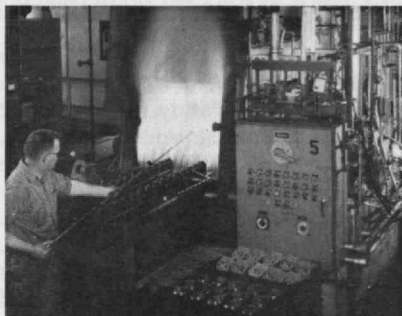
- ☐ Noam Chomsky. ☐ Joseph Pedlosky. ☐ Paul Gray.
☐ Kenneth Wadleigh. ☐ William Watson.

7. Which of the following is the M.I.T. graduate to most recently receive the Nobel Prize?

- ☐ Dr. Charles Townes. ☐ Dr. Robert Mulliken. ☐ Dr. Richard Feynman.
☐ Dr. Robert Woodward. ☐ Dr. Jerrold Zacharias.

8. Which was the subject on which the Carnegie Commission headed by Dr. James R. Killian, Jr., '26, made its recommendations?

- ☐ Government-sponsored research. ☐ Educational television.
☐ Federal aid to cities. ☐ Aid to higher education.



When you think conventional weaving...

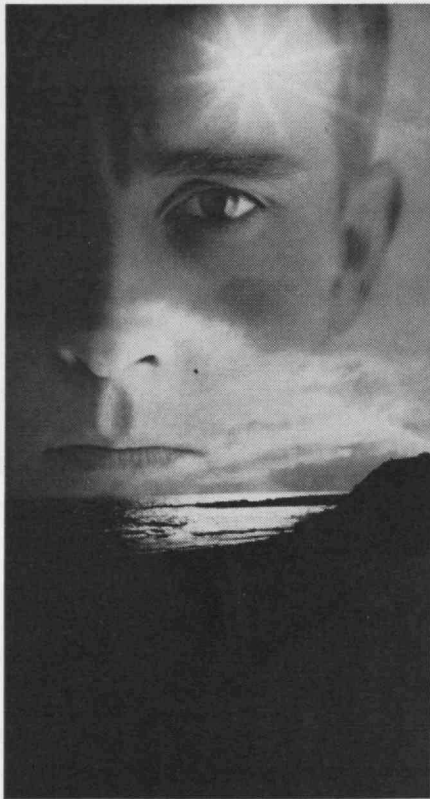
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An Institute Gazette

many as 24). By 7 p.m. the News Editor has submitted what he calls a "poop sheet" indicating the important stories and their approximate length, and the Sports Editor has done the same for his page. By 8 p.m. as many as 35 people are writing and rewriting, correcting copy, confirming reports, and printing photographs. Three hours later the headlines can be written, and midnight is the target for "putting the paper to bed." Proofs from the typesetter are processed by the Managing Editor during the following day and that evening are delivered to a Lowell, Mass., printer from whom 5,000 copies of each issue arrive in Cambridge during the early morning hours, to be distributed to sales boxes throughout the campus by the business staff before 9 o'clock.

Like all newspaper schedules, this one is subject to changes. When the Northeast power failure interrupted normal activities throughout the East 18 months ago, *The Tech* got the story, rushed it to Lowell, and put the regular issue on the stands at the regular time next morning—a feat the *New York Times* could not match.

The Tech's news coverage is now so

good that the paper has become indispensable for those who would be well informed about the Institute community. M.I.T.'s Public Relations Office is one important source of news; the student Public Relations Committee is another. So is a weekly press conference with Kenneth R. Wadleigh, '43, Dean of Student Affairs, to which President Howard W. Johnson also comes when his schedule permits. The Features Editor is responsible for a popular editorial-page column called "footnotes," comments and predictions on the current scene. (*The Tech* accurately predicted the Field Day and UAP election winners this year, among other successful forecasts.) There's also impressive Greater Boston entertainment coverage, a column of news from other colleges, and an active letters section.

But the real key to *The Tech's* news success is a staff of alert and effective student reporters and photographers. It is their insight and diligent work that result in 4500 paid circulation twice a week—and that now encourage the board, having successfully taken the paper from weekly to twice-weekly publication in 1960, to think about giving M.I.T. a daily before 1970.

1967-1968 Sloan Fellows

Four M.I.T. alumni are among the 45 young business executives who will return to the Institute in June for 12 months' advanced study in the Sloan School of Management under Alfred P. Sloan Fellowships. The four are:

- Horace M. Davis, '53, of Wright-Patterson Air Force Base, who studied in aeronautical engineering here.
- Lee M. Holmes, '60, of General Dynamics Corporation, aeronautical engineering.
- Arthur B. Horton, Jr., '46, Bell Aerosystems Co., electrical engineering.
- Alberto Jimenez, '56, Ministry of Marine, Lima, Peru, naval engineering.

Sloan Fellowships for participation in the year-long executive development program at the Institute are considered among the highest honors which can come to young men during their management careers. Their employers nominated the fellows for participation in the program to accelerate their development into positions of major executive responsibilities for the future, according to Peter P. Gil, Associate Dean of the Sloan School who is in charge of the fellowships.

This year's group, Dean Gil points out, includes representatives of Federal as well as foreign organizations, reflecting an "increasing concern with developing managerial resources by the U.S. government and by industrial

building construction alteration

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STEVE HAWKINS '57

organizations overseas." In addition to Mr. Jiminez, nine Sloan Fellows will come from overseas for the 1967-1968 program—two from England and one each from Canada, Ireland, Norway, Japan, Yugoslavia, the Netherlands, and Cyprus.

Academies' Elections

Eleven members of the M.I.T. Faculty have been elected to membership in the prestigious National Academy of Sciences and National Academy of Engineering.

The new National Academy of Sciences members are Raymond L. Bispplinghoff, Head of the Department of Aeronautics and Astronautics; Frank A. Cotton, Professor of Chemistry; Norman Levinson, '33, Professor of Mathematics; Francis E. Low, Professor of Physics; Walle J. H. Nauta, Professor of Neuroanatomy; and Ascher H. Shapiro, '38, Head of the Department of Mechanical Engineering.

Elected to the new National Academy of Engineering are Manson Benedict, '32, Head of the Department of Nuclear Engineering; Jay W. Forrester, '45, Professor of Industrial Management; Jerome C. Hunsaker, '12, Emeritus Professor of Aeronautical Engineering; Arthur T. Ippen, Ford Professor of Engineering; and James R. Killian,

Jr., '26, Chairman of the Corporation.

The two academies, which are also related to the National Research Council, are private organizations established to honor leading scientists and engineers and to bring their advice to the Federal government in matters of policy.

N.C.A.A. Scholarship

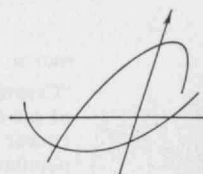
Robert M. Hardt, '67, star forward on the M.I.T. 1966-1967 varsity basketball team, has won a \$1,000 graduate fellowship from the National Collegiate Athletic Association.

Hardt is a mathematics major with a 4.6 cumulative average (out of a perfect 5.0) for his four years of academic work. This year he was the top scorer on the varsity basketball team (415 points, 18.0 average), and he is considered the athlete "to have improved most in basketball since his high school days."

Wrestling Champion

It's official: David N. Schramm, '67, is one of the top collegiate wrestlers in the U.S. He came away from the national N.C.A.A. wrestling tournament at Kent State University in March in a four-way tie for seventh place, having defeated the Ivy League champion from Princeton in the first round of the nationals.

Career Appointments



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PHOTOS: ARTHUR A. KALOTKIN, '68

"Cream the co-ed," a version of pie-throwing slapstick (lower right), was among the popular diversions at the annual Alpha Phi Omega spring carnival; another was the privilege of wrecking an automobile, at which some visitors' ambitions over-reached their power (right). Carnival proceeds support APO's campus and community service activities.



An Institute Gazette

Promotions

Promotion of 22 members of the M.I.T. Faculty to the rank of professor and 42 members to the rank of associate professor, effective July 1, 1967, has been announced by Jerome B. Wiesner, Provost. The promotions are:

To Professor:

Eugene Bell, Biology
Frank Bonilla, Political Science
Gene M. Brown, Biology
Lynwood S. Bryant, Humanities
Prescott D. Crout, '29, Mathematics
Jerome I. Friedman, Physics
Robert G. Gallager, Electrical Engineering
Paul E. Gray, '54, Electrical Engineering
Peter Griffith, '56, Mechanical Engineering
Francis B. Hildebrand, '40, Mathematics
Fred C. Iklé, Political Science
Henry W. Kendall, '55, Physics
Robert L. Kyhl, '47, Electrical Engineering
Patrick Leehey, Naval Architecture and Marine Engineering
John D. C. Little, '48, Management
Theodore R. Madden, '49, Geology and Geophysics
G. Hubert Matthews, Modern Languages
Leo B. Moore, '37, Management
Stanislaw Olbert, '53, Physics
Ernest Rabinowicz, Mechanical Engineering
Lawrence Rosenson, Physics
George P. Wadsworth, '30, Mathematics

To Associate Professor:

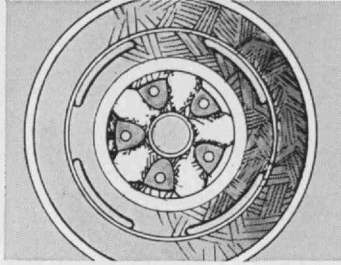
Arnold E. Amstutz, '58, Management
Donald W. Anderson, Mathematics
Charles Batterman, Athletics
Donald L. M. Blackmer, Political Science
Roger W. Brockett, Electrical Engineering
Hung Cheng, Mathematics
Edward B. Curtis, Mathematics
Alan Davison, Chemistry
Alvin W. Drake, '57, Electrical Engineering
Hubert L. Dreyfus, Humanities
Arthur E. Farnham, Jr., Athletics
Leonard J. Fein, Political Science
Gordon P. Garmire, '62, Physics
Alan Hein, '51, Psychology
Thomas S. Huang, '60, Electrical Engineering
Robert S. Kennedy, '59, Electrical Engineering
James L. Kinsey, Chemistry
Lawrence M. Lidsky, '62, Nuclear Engineering
Chung L. Liu, '60, Electrical Engineering
Simon C. Moss, '56, Metallurgy
Joseph Pedlosky, '59, Mathematics
Sheldon Penman, Biology
Frank E. Perkins, '55, Civil Engineering
Otto H. Poensgen, '59, Management
Daniel G. Quillen, Mathematics
David B. Ralston, Humanities
Adel F. Sarofim, '57, Chemical Engineering
Carl M. Shakin, Physics
Karl Shell, Economics
Gerald Silverman, Nutrition and Food Science
Kenneth A. Smith, '58, Chemical Engineering
Robert E. Stickney, Mechanical Engineering
M. Nafi Toksoz, Geology and Geophysics
Donald E. Troxel, '60, Electrical Engineering
Wolf R. Vieth, '56, Chemical Engineering
William B. Watson, Humanities
Bruce D. Wedlock, '56, Electrical Engineering
Rainer Weiss, '55, Physics
Wayne A. Wickelgren, Psychology
August F. Witt, Metallurgy
Laurence R. Young, '57, Aeronautics and Astronautics
Thomas O. Ziebold, Nuclear Engineering

Chairman of the Faculty

Walter A. Rosenblith, Professor of Communications Biophysics in the M.I.T. Department of Electrical Engineering, will be chairman of the Faculty for 1967-1968.

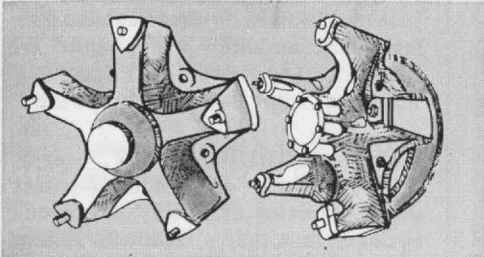
Professor Rosenblith has had a leading role in M.I.T. academic affairs

this
is what a
"wheel builder"
builds.

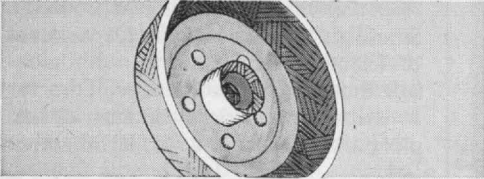


Wilfred D. J. MacDonnell '34
President, Kelsey-Hayes Company

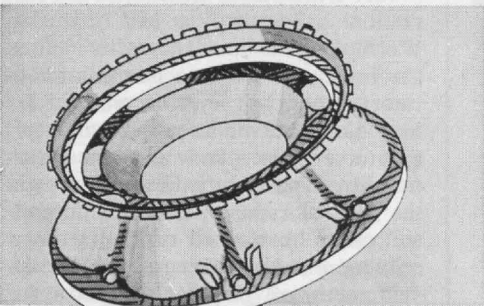
this is what Kelsey-Hayes builds.



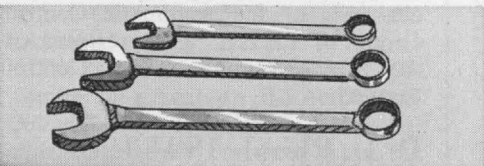
Cast Aluminum & Cast Steel Spoke Truck Wheels



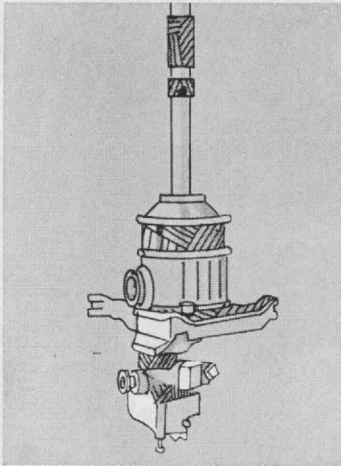
Hub and Brake Drums



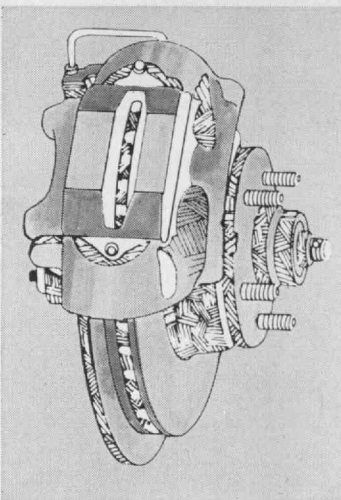
Aerospace Weldments



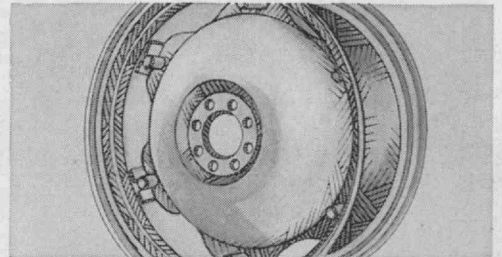
Hand Tools



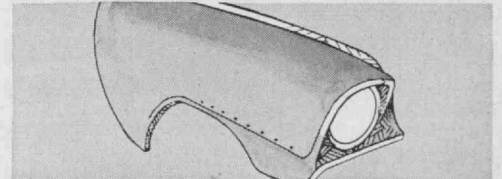
Helicopter Transmissions



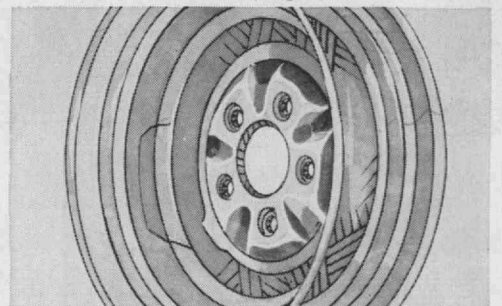
Kelstar Disc Brakes



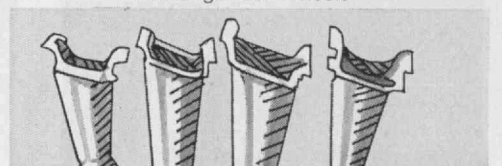
Farm Tractor Wheels



Stampings



Passenger Car Wheels



Jet Engine Blades

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An Institute Gazette

since he joined the Institute in 1951. He is widely known for his research and teaching on the quantification of electrical activity in the nervous system, combining aspects of electrical engineering, mathematics and physics with neuro-physiology and psychophysics in work on the processes by which organisms carry on sensory communication with their environment. He was chairman of the 1966 Alumni Seminar and chairman of the M.I.T. Committee on Non-Degree Education, and he has had an important role in planning for disciplinary activities in the communications sciences at M.I.T.

As chairman of the Faculty, Professor Rosenblith will head the influential Committee on Educational Policy.

E.S.L. Administrator

John E. Ward, '43, has been named deputy director of M.I.T.'s Electronic Systems Laboratory. He will assume much of the laboratory administrative responsibilities, according to Louis D. Smullin, '39, Head of the Department of Electrical Engineering, with a result that J. Francis Reintjes, Director of the laboratory, may in turn devote more time to Project INTREX activities.

Mr. Ward was a member of the Radiation Laboratory at M.I.T. during World War II and thereafter joined the Institute's Servomechanisms Laboratory, which has since become E.S.L.; here he has served as project engineer, executive officer and assistant director. Mr. Ward's early research was in the field of radar and automatic control; later he worked on digital data-reduction and most recently on the development of graphical displays for computer-aided design. He has been chairman of the Automatic Control Group of I.E.E.E. and president of the American Automatic Control Council.

D. L. Rhind, 1891-1967

Delbert L. Rhind retired in 1956 after 35 years' loyal service to M.I.T., in the course of which he made "important contributions in the administration of the Institute's business affairs," in the words of Howard W. Johnson, President. Mr. Rhind died in Clearwater, Fla., on April 4.

While he was a member of the staff of the Old Colony Trust Company, where he went to work in 1909, Mr. Rhind was "loaned" to the Institute for two months in 1921. He stayed on to become assistant bursar, bursar

(1934), and assistant treasurer (1954).

In the meantime, he was secretary of the Technology Loan Fund, a founder of the Massachusetts Association of Non-profit Schools and Colleges, held official posts in the Eastern Association of College and University Business Officers and the National Association of Educational Buyers, and was a director of the Harvard Trust Co. and the Charlestown Savings Bank.

Will to Wire

Note in the East Campus *Intruder* for April 11:

"What's with the wacky will to wire around this wondrous ward? Is the pressure so pernicious (sic.) that practically no people have reciprocal perseconds for play? If you're one of the fulsome few with free time, then join the E.C.E.E. Lab (East Campus Electronics Lab) and revel in relaxation."

Victory for the Co-Eds

The co-eds' attack on the all-male bastion of organized athletics at M.I.T. is beginning to bear fruit.

For a three-year trial period, co-eds are now members of the Athletic Association; at the end of the three-year period the situation will be reviewed and the arrangements either terminated or made permanent through a constitutional amendment.

The M.I.T.A.A. membership means that, for the next three years, any women's team that has engaged in intercollegiate competition for three consecutive years is designated a varsity sport; the result is that the co-eds now have two varsity teams—in sailing and crew. There is provision for an insignia for co-ed teams, but that, according to *The Tech*, remains to "be determined through discussion between a women's representative and the Varsity Club subject to review by the Executive Committee of the Athletic Association."

The same resolution assures the women of a seat on the Intramural Council, which operates the intramural athletics program, for three years; but it is not yet clear how women's intramural competitions will be organized.

Nuclear Fellows

Forty M.I.T. students—more than from any other U. S. educational institution—are among the 250 college graduates to receive fellowships for study in nuclear science and engineering in 1967-1968 from the U.S. Atomic Energy Commission. The fellowship program is administered for the Commission by Oak Ridge Associated Universities, Oak Ridge, Tenn.



PHOTOS: GUS P. KAYAFAS, '69

The Francis Amasa Walker Assembly is the pride of the Walker Memorial student staff and a landmark of the Boston social season. (Above: President and Mrs. Howard W. Johnson; Burns Woodward, '67, Walker captain; Cheryl A. Cretin, '68, Walker assistant captain; and Mrs. and Mrs. Harold E. Edgerton ('27) leading the 1967 grand march. Below: Dr. and Mrs. James R. Killian, Jr. ('26) and Dean and Mrs. Kenneth R. Wadleigh ('43) in the receiving line.) Beginning next year it will be known as the William Hamilton Carlisle Jr. ('28) Assembly, in honor of its founder and adviser who died early this year.

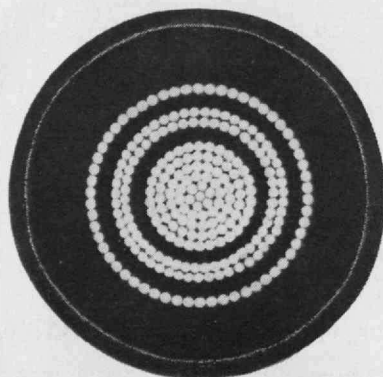




on guard

This is a hex sign, signifying long life, one of many which Pennsylvania Dutch farmers put on their barns to protect them against the elements—storms, drought, crop failure. You'll still see hex signs in Amish country, but these prosperous farmers do not rely on superstition for long life and success. They work too.

Below is a cross-section of a cable. It looks like many other cables, but the big difference is the permanent protection furnished by the insulation. That's where Kerite comes in. No other cable has been proved by time in the way the Kerite has. It works for you. Put a hex on trouble with Kerite. The Kerite Company, 30 Church Street, New York, N. Y. 10007.



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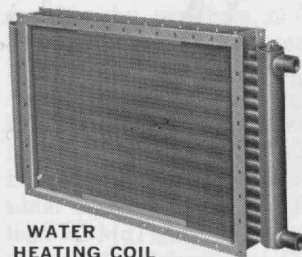
B. E. JAMES '32, President



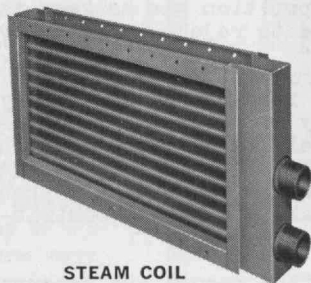
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cooling coils
boost efficiency,
cut maintenance

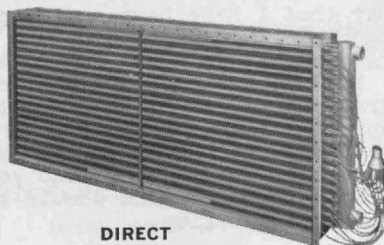
McQUAY HI-F COILS FOR STEAM, WATER HEATING, WATER COOLING or DIRECT EXPANSION



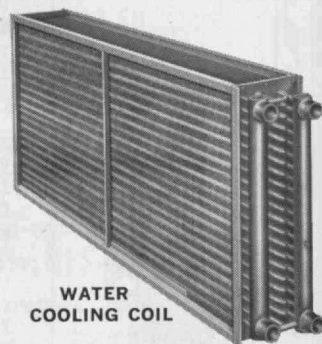
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STEAM COIL



DIRECT
EXPANSION COIL



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Fact: the more efficient your coil, the less your operating costs.

Fact: McQuay's HI-F is the most efficient coil ever designed. (Famous "Ripple Fins" combined with staggered tube construction prolong contact of air and metal for maximum heat transfer.)

What about maintenance costs? Both tubes and headers are heavy seamless copper. Joints are brazed with special alloys. You enjoy many years of trouble-free service.

McQuay HI-F coils are available in $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and 1" Tube diameters, one or more rows deep, with one to 14 fins per inch.

HI-F Coils are available for special fluids and/or atmospheres in the widest range of materials including copper, aluminum, carbon steels, stainless steel (various types), monel, inconel, nickel, cupro-nickel, admiralty metal, red brass, etc. For special applications, from research through engineering to precise, quality-controlled production, *McQuay has more coil experience than anyone in the industry.*

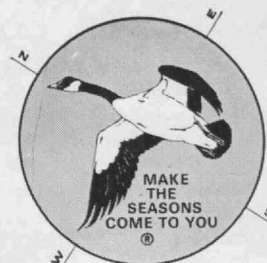
Look to the leader for coils—see your McQuay representative, or write: McQuay, Inc., Box 1551, 13600 Ind. Park Blvd., Minneapolis, Minn. 55440.

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LETTERS THAT NEVER WERE SENT

(and more's the pity) DEPARTMENT

Each spring tens of thousands of secondary school seniors (and twice that many parents), wait with bated breath for those letters that never seem to come from the Colleges of Their Choice. This year one girl was ready with a reply, presumably never sent. It warrants a wider audience than that provided by The College Board Review, in whose pages it appeared.



Director of Admissions
.....University
.....,

Dear Sir (or Madam):

Please excuse this form letter, but current pressures militate against a more personal note.

I deeply regret that I shall be unable to accept your invitation to be a member of your next year's freshman class. Perhaps this letter will do something to alleviate your natural and understandable disappointment.

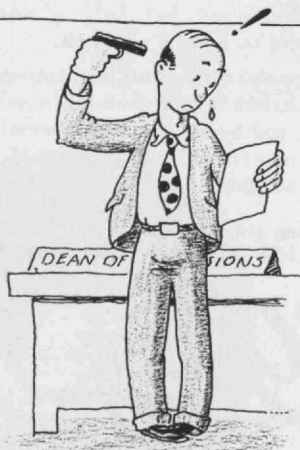
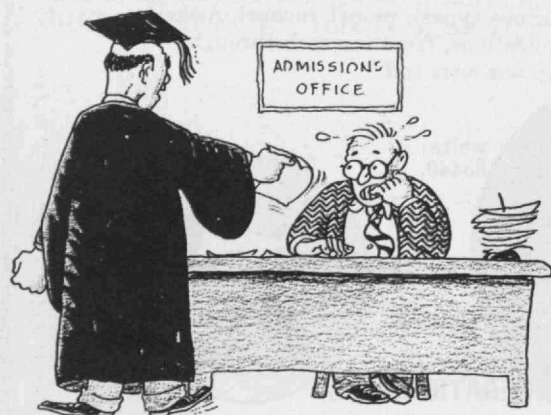
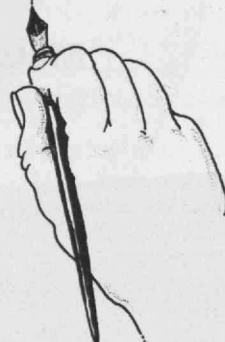
Many fine colleges have demonstrated to me by their past performance that they have the qualifications to be successful in accepting students, and before my decision was made, I gave careful and individual attention to each college. However, the competition was so keen this year that I have been compelled to reject many deserving colleges.

This decision should not be interpreted in any way as a reflection on your university or the qualifications of your admissions office personnel. The catalog and other literature from your office suggest that you have many fine qualities to recommend you. It seems highly probable that you can and should make a distinct contribution to education.

Let me commend you on your fine record and encourage you to continue in your endeavors. Please feel free to write or contact me if I may be of further assistance.

Sincerely yours,

Cynthia



H.B. KANE

High Acceptance

Nearly two-thirds of M.I.T.'s pre-medical students are admitted to medical schools, and this places the Institute 20th among the 100 American colleges and universities providing the largest number of first-year medical students.

Figures of the Association of American Medical Colleges show that 28 of the 44 students (63.6 per cent) applying to medical school from M.I.T. in 1964-65 were accepted, and 26 of the 28 actually entered medical school in the fall of 1965. On the average, the M.I.T. students each applied to seven medical schools.

Harvard University with 261 pre-medical applicants, the largest total, had 75 per cent of them accepted; the highest percentage accepted (87.2) was from Rice University, with Brandeis University and Carleton College following closely.

National Scholars

More than 150 outstanding high school seniors will be designated as M.I.T. National Scholars by Howard W. Johnson, M.I.T. President, this spring, and they will receive the awards in ceremonies conducted in the students' communities by members of the M.I.T. Educational Council working with school officials.

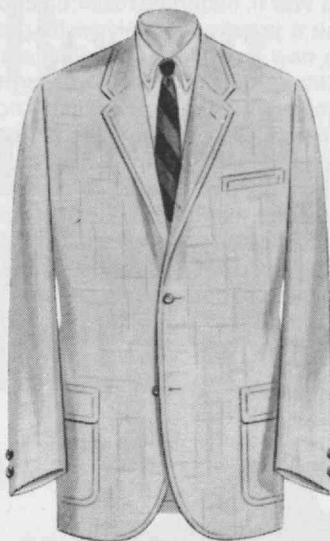
The M.I.T. National Scholars will be the best-qualified applicants admitted to the Class of 1971, judged on the basis of both their academic and personal qualifications, according to William H. McTigue, '54, executive secretary of the Educational Council.

They will receive the awards whether or not they ultimately decide to enter the Institute. The designation of each National Scholar is an honor to demonstrate that "we do recognize his accomplishments and abilities and that he will be most welcome as a member of the Class of 1971," Mr. McTigue says.

Guggenheim Awards

Five members of the M.I.T. Faculty have received coveted Guggenheim Fellowships for study and research in their professional fields in 1967-68.

They are Edwin B. Curtis, Assistant Professor of Mathematics, for studies in algebraic topology; Vernon M. Ingram, Professor of Biochemistry, for research on the behavior of cells in tissue culture; Ali Javan, Professor of Physics, for theoretical studies in quantum electronics; Irving E. Segal, Professor of Mathematics, for work on a mathematical theory of the construction of quantum fields; and Dietmar



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OUR LIGHTWEIGHT SPORTWEAR
features our own styling and colors

SPORT JACKETS of British polyester-and-linen, woven in Ireland. In faded blue, yellow, green, bronze-gold, red or straw, \$60

Navy, stone or faded blue Brooksweave, \$42.50

Dacron polyester-and-rayon jackets in Glenurquhart plaids of grey-blue or green-tan on white grounds, \$42.50

Hand-woven cotton India Madras plaids, \$50

Cotton seersuckers, \$35

BLAZERS of lightweight Dacron-and-worsted in navy, hunter green or medium blue, \$75

ODD TROUSERS of Dacron-and-worsted tropical, from \$30

Polyester-and-linen, \$26.50

Dacron-and-cotton Brooksweave, \$18.50

Permanent press Fortrel polyester-and-cotton, \$13

BERMUDA LENGTH SHORTS, from \$12

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Materials testing: today's growth technology.

Since the end of World War II, materials research and development has become a priority technology. Its growth has been marked by a new language: viscoelastic properties, complex modulus, tensile energy absorption, rheology — the terminology of the space age. And its growth has been marked by an ever increasing need for imaginative materials researchers together with versatile, precise test equipment matched to their advanced needs.

For more than two decades, Instron has been producing such equipment — sophisticated stress-strain testing instruments for college, government and industrial laboratories. Scientists use Instron equipment for basic research, to better understand the capabilities of existing

materials, and to develop new materials. Instron instruments and accessories may be found wherever there is a need for extremely accurate data on physical properties — from research on single crystals and whiskers to the development of new ablative materials for the nation's space program.

As a service, Instron distributes, without charge, reprints of technical papers of particular interest to materials scientists and engineers. Each is written by an expert in his field.

For a list of free reprints, send for *Application Series*, Instron Corporation, 2500 Washington St., Canton, Massachusetts 02021.



An Institute Gazette

Seyferth, Professor of Chemistry, for research on transition metal chemistry.

In all, the Foundation's 1967 awards totalled \$2,196,100, given to 294 scholars, scientists, and artists. There were over 2,000 applicants.

Industry and Science

Making what it says is "the most thorough study of college reputations ever carried out among students," McCall's magazine finds that college editors think M.I.T. is the right school for boys who want to become leaders in industry and for those who have ambitions as distinguished scientists.

M.I.T. also gets, according to the survey results, "the least attractive boys," but its students are, next only to Harvard, the brightest on American campuses.

McCall's conclusion from the survey: College editors are a cosmopolitan bunch, well informed about institutions all over the country. But perhaps few of them have ever travelled two miles down the Charles.

Sloan Research

Four assistant professors on the M.I.T. faculty have won two-year research fellowships from the Alfred P. Sloan Foundation. The recipients are Donald W. Anderson, mathematics; Raymond Y. Chiao, '65, physics; Alan Davison, chemistry; and Daniel G. Quillen, mathematics. They are among 15 New Englanders and 96 scientists from throughout the U.S. named for the fellowships, which average \$8750 per year.

Cambridge Tourists

James R. Killian, Jr., '26, Chairman of the Corporation, and Howard W. Johnson, President, are among the members of a subcommittee of the Cambridge Citizens Advisory Committee to study traffic and other visitor problems in the city when the John F. Kennedy Memorial Library and School of Government are completed near Harvard Square.

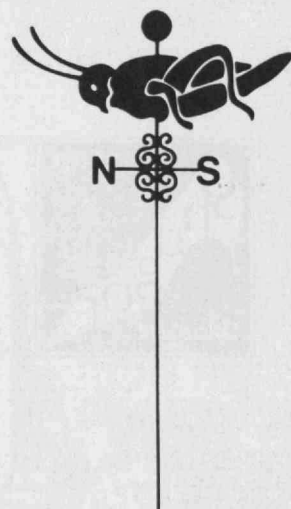
George A. McLaughlin, chairman of the committee, thinks that the influx of tourists may seriously aggravate traffic problems which already plague Harvard Square, and he says redevelopment is urgent. "Cambridge is a university city," he has said, "and it is our job now to see that it becomes and remains the best university city in the world today."

Redistricting

Chandler H. Stevens, '67, the only Independent in the Massachusetts House

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PHOTO: ROBERT LYON FROM TECH TALK

Chandler H. Stevens, '67, the first Independent to win a seat in the Massachusetts House in 50 years, is working with Ronald F. Zeilinger (left) of the M.I.T. Computation Center on a computer program to help redistrict Massachusetts in accord with Supreme Court directives.

of Representatives, is now using the facilities of the M.I.T. Computation Center to develop a redistricting plan for Massachusetts, which must meet new Constitutional requirements before the 1968 elections.

Representative Stevens told *The Tech* that three Constitutional criteria must be taken into account: there must be no "postage stamp" districts, all districts must have reasonably equal populations, and districts must be effectively compact. The program on which he is working, Representative Stevens said, uses a definition of compactness "familiar to the M.I.T. campus. It equates a district to a moment of inertia around a center of gravity. The technique involved is minimizing the moment of inertia."

But redistricting should be underway by midsummer, and Representative Stevens is skeptical. "I don't want to build up false expectation," he warned *The Tech's* reporter John J. Foran, 3rd, '70.

Answers to The Tech's M.I.T. news quiz (page 52):

1. Chile.
2. Fencing.
3. Jerome Wiesner.
4. Louis Smullin and Victor Weisskopf.
5. Elimination of liquor restrictions.
6. Joseph Pedlosky.
7. Dr. Robert Mulliken.
8. Educational television.

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PHOTO: JAMES F. COYNE

Presidents Ruth M. Adams and Howard W. Johnson came before newsmen and television cameras on May 17 to announce plans for a new exchange program designed to widen the educational opportunities for students at both schools.

An Institute Gazette

M.I.T. and Wellesley

M.I.T. and Wellesley have agreed on an experimental program under which students enrolled in one may take courses in the other for full credit without payment of additional tuition.

A joint faculty committee will work out the details, and the plan will probably be in effect in 1968.

It was announced with fanfare at an Algonquin Club press conference by Presidents Ruth M. Adams of Wellesley and Howard W. Johnson of M.I.T. on May 17, following approval by the Wellesley Board of Trustees and the Executive Committee of the M.I.T. Corporation and faculty meetings at both institutions. At the press conference, both Miss Adams and Mr. Johnson emphasized that the purpose is "to extend the diversity of educational experiences now available to students in the curricula and the environments of the two institutions."

It is not, they insisted, a plan for merger. "No formal organizational bond has been considered, and none is contemplated."

"We believe that it is important for each school to retain its own character, tradition and autonomy," they said in a joint statement.

The M.I.T.-Wellesley plan has extensive precedent at M.I.T. A similar arrangement has been in effect with Harvard University for many years, and more than 300 Harvard and M.I.T. students—and 13 Radcliffe students—are involved in that exchange this year. In addition, there are smaller, specialized cross-registration plans

between M.I.T. and the African Studies Program of Boston University, the School of Dental Medicine at Tufts University and the Woods Hole Oceanographic Institution.

There was enthusiastic response to the Wellesley-M.I.T. announcement on both campuses and observers at each school seemed to assume that the flow of students would be all in his direction. Presidents Adams and Johnson refused to speculate, emphasizing the plan's purpose of "extending the opportunities open to students in each school while maintaining the integrity of each home base."

The two presidents guessed that the plan when it first goes into effect may involve 60 to 80 students from each school. The program will be subject to continuing faculty review and to final evaluation after five years of experience.

President Johnson was at pains to assure M.I.T.'s 369 women students that he expected the plan to strengthen the position of full-time women students at M.I.T. "The success of M.I.T.'s coeds," he said, "led us to think that this new step would be appropriate."

"The achievement of increasing numbers of girls at M.I.T.," he said, "has convinced us that there need be no reluctance in admitting those who are adequately prepared and sufficiently motivated. We expect to increase the number of women students admitted at M.I.T., and we expect that many of them will have the rewarding experience of taking one or more courses at Wellesley."

Puzzle Corner

(Continued from page 9)

I suppose you're right, but how can my *glance* meet the conditions of Problem 33. Apparently conversational English is more difficult than it looks.

34—You sit south and must make 7 spades. West's opening lead is the king of clubs. How do you play the hand given the following distribution?

		North (dummy)	
		♠ A K Q J	
		♥ A Q 8	
		♦ Q J 10 9 8 7	
		♣ —	
West		East	
♠ 5 4 3 2		Immaterial	
♥ K J 10 9 7 6			
♦ —			
♣ K Q J			
		South (declarer)	
		♠ 10 9 8 7 6	
		♥ —	
		♦ A K	
		♣ A 10 9 8 7 6	

Here is Richard Minnick's solution.

Dear Mr. Gottlieb:

I enjoy your column in Technology Review each month. However, I find most of the problems too taxing for my lesser mathematics (S.M./S.B. Industrial Management, '66)—or, rather I should say that I do not have enough time available in my busy schedule! Nevertheless, I was amused by Problem 34 enough to (I think) see it through:

Given the disclosure of West's hand and therefore East's, one does not have to protect against the rare chance that East may be void in Clubs on the first trick. West opens with the King of Clubs which is taken by South's Ace of Clubs, while dummy discards a diamond. A Spade is then led to dummy, drawing West's first trump. The dummy cashes the Ace of Hearts, with South discarding a Diamond. Dummy then leads a Heart which is trumped by South. South again leads a Spade toward dummy. The third Heart is returned and ruffed by South. South then leads his last Spade to dummy. North returns the last Spade, declarer discards the second Diamond and West plays his last Spade. At this point North has five Diamonds, South has five Clubs and West is left with two Clubs and three Hearts, thus making dummy's five Diamonds good.

Keep up the good work. I'd like to see some more Bridge problems.

♦63—What is the remainder when 5^{100} is divided by 101?

The following is from James S. Kaltenbronn, '60.

Dear Mr. Gottlieb:

Occasionally we chemists can work out some of your problems. Enclosed are solutions to problems 63 and 64 posed in the April, 1967, issue of Technology Review. These solutions were arrived at with the help of Duane Morrow.

Problem 63: Since 101 is a prime, $5^{100}/101$ is simply an example of Fermat's theorem, which states that for any prime p and any integer a not divisible by p , $a^{p-1} \equiv 1 \pmod{p}$; that is, the remainder is 1.

This theorem is easily proven: any integer a not divisible by p is congruent mod p to one of the integers $1, 2, 3, \dots, p-1$. If p is a prime, it is readily seen that the series of integers $a, 2a, 3a, \dots, (p-1)a$ are congruent mod p , in some order, to the series of integers $1, 2, 3, \dots, p-1$. Therefore, by elementary algebra of congruences, $(a)(2a)(3a) \dots [(p-1)a] \equiv (1)(2)(3) \dots (p-1) \pmod{p}$, or $a^{p-1} (p-1)! \equiv (p-1)! \pmod{p}$.

Since p is a prime, $(p-1)!$ and p must be relatively prime, so that $a^{p-1} (p-1)! / (p-1)! \equiv [(p-1)! / (p-1)!] \pmod{p}$ or $a^{p-1} \equiv 1 \pmod{p}$.

Also solved by Douglas J. Hoylman, '64, Robert L. Knighten, '62, John L. Joseph, '40, Henry S. Lieberman, '61, and Mark H. Yu, '70.

64—A courier is in the rear rank of a column one mile long. He leaves his position to deliver a message to his commanding officer in the front rank, and then returns to his original position, arriving there precisely at the

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Puzzle Corner

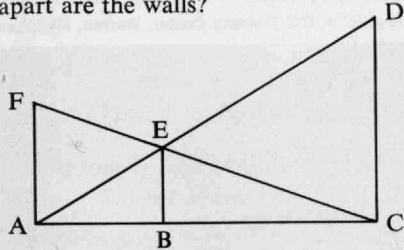
To check,

$$\begin{aligned} & \frac{1}{2} \sin 64^{(2/7)^{\circ}} + 1/(\sin^2 64^{(2/7)^{\circ}} - 1) \\ & \text{should equal } 1. \\ & \approx \frac{1}{2} \csc 64^{(2/7)^{\circ}} + 1/(4 \sin^2 64^{(2/7)^{\circ}} - 1) \\ & \approx \frac{1}{2} (1.1059) + 1/[4(.81171) - 1] \\ & \approx .5530 + 1/(3.24684 - 1) \\ & \approx .5530 + 1/2.24684 \\ & \approx .5530 + .4451 \\ & \approx .998 \approx 1. \end{aligned}$$

24—Find the missing element in the following sequence (whose rightward continuation is undefined): 10, 11, 12, 13, 14, 15, 16, 17, 20, 22, 24, —, 100, 121, 10000.

The missing number is 31. The series consists of the representation of 16 ($1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$) in bases 16_{10} to 2_{10} .

25—Two ladders 30 and 40 feet long are set between two vertical walls, the tops of the ladders on opposite walls. They cross at 10 feet above the horizontal between the walls. How far apart are the walls?



Given $AD = 40$, $CF = 30$, $EB = 10$, FA perpendicular to AC , EB perpendicular to AC , and DC perpendicular to AC . Find AC (to be called d).

By the Pythagorean theorem,
 $CD = \sqrt{40^2 - d^2} = \sqrt{1600 - d^2}$, and
 $AF = \sqrt{30^2 - d^2} = \sqrt{900 - d^2}$.
 $1/AF + 1/CD = 1/BE$ (1)

Proof:

$AF/AC = BE/BC$, by similar triangles (a)

$BC = (AC - BE)/AF$ (b)

$CD/AC = BE/AB = BE/(AC - BC)$, by similar triangles (c)

$CD/AC = BE/[AC - (AC - BE)/AF]$, substituting (2) (d)

$CD/1 = BE/(1 - BE/AF)$ (e)

$BE = CD - (CD - BE)/AF$ (f)

$AF \cdot BE = AF \cdot CD - CD \cdot BE$ (g)

$AF \cdot BE + CD \cdot BE = AF \cdot CD$ (h)

$(AF + CD) BE = AF \cdot CD$ (i)

$BE = (AF \cdot CD)/(AF + CD) =$ (j)

$1/(1/AF + 1/CD)$ (k)

$1/BE = 1/AF + 1/CD$ (k)

From (1) is obtained

$$1/\sqrt{1600 - d^2} + 1/\sqrt{900 - d^2} = 1/10$$

$$1/\sqrt{100(16 - d^2/100)} + 1/\sqrt{100(9 - d^2/100)} = 1/10$$

Let $y = d^2/100$: (2)

$$1/\sqrt{100(16 - y)} + 1/\sqrt{100(9 - y)} = 1/10$$

$$1/10\sqrt{16 - y} + 1/10\sqrt{9 - y} = 1/10$$

$$1/\sqrt{16 - y} + 1/\sqrt{9 - y} = 1$$

$$1/\sqrt{16 - y} = 1 - 1/\sqrt{9 - y} = (\sqrt{9 - y} - 1)/\sqrt{9 - y} \quad (3)$$

Squaring both sides:

$$1/(16 - y) = (10 - y - 2\sqrt{9 - y})/$$

$$\begin{aligned} & (9 - y) \\ & (16 - y)(10 - y - 2\sqrt{9 - y}) = 9 - y \\ & y^2 + 160 - 26y - (32 - 2y)\sqrt{9 - y} = 9 - y \\ & y^2 - 25y + 151 = \sqrt{9 - y} \\ & (32 - 2y) \end{aligned} \quad (4)$$

Again squaring,

$$\begin{aligned} & y^4 + 625y^2 + 22801 - 50y^3 + 302y^2 - \\ & 7550y = (9 - y)(4y^2 - 128y + 1024) \\ & y^4 - 50y^3 + 927y^2 - 7550y + 22801 = \\ & -4y^3 + 164y^2 - 2176y + 9216 \\ & y^4 - 46y^3 + 763y^2 - 5374y + \\ & 13585 = 0 \end{aligned} \quad (5)$$

All useful values of d are in the interval $0 < d < 30$ (distances are positive; $AC < CF$ because the hypotenuse of a right triangle is greater than a leg):

$$0 < d < 30$$

$$0 < d^2 < 900$$

$$0 < d^2/100 < 9$$

$$0 < y < 9$$

Horner's method gives $y = 6.775+$. $y = 6.775684$ is obtained from a linear approximation:

$$d^2/100 \approx 6.775684$$

$$d^2 \approx 677.5684$$

$$d \approx 26.03.$$

Substituting in the original equation, $d = 26.03$ gives BE a length of 10 to 5 significant figures. The distance between the walls is approximately 26.03 feet.

Congratulations on an excellent column. Since Technology Review is sent through the mail, you may be required to place a warning that "these problems may be habit-forming" and that "repeated use may be detrimental to your work."

I still need solutions to 21 and 23. Any takers?

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'96

While removing magazines from a cabinet to make room for some present publications one number fell, and it was the May 1930 Technology Review. Naturally I looked for '96 notes. There were five columns by Charles Locke, Secretary, and John Rockwell, Assistant Secretary. The first column was an account of **Charles Hyde** and his family's trip from San Francisco through Europe and the principal western countries. A dozen men are mentioned, some extensively, and six from whom information is desired. There are now 16 members of the class from whom the present Secretary desires information that the news may be published in the notes; a personal letter would be most welcome. Charles Hyde should have the first place as he had in the 1937 notes; furthermore he owes us a letter.—**James M. Driscoll**, Secretary, 129 Walnut Street, Brookline, Mass.

'00

Professor **Lawrence S. Smith** died March 19, 1967, aged 87 years, after a long illness. He was born in Peabody, Mass., September 27, 1879, and graduated from M.I.T. from Course II in 1900. After a short service as draftsman in Washington for eight weeks with the Superintendent of the Capitol and then for ten weeks with Davis and Fisher Machine Company, North Andover, he in 1900 joined the staff of the Mechanical Engineering Department at M.I.T. where he remained for 50 years. For three years he was a research assistant and in 1903 became an instructor. In 1911 he was appointed assistant professor and in 1922 associate professor, retiring in June 1945 but remaining as lecturer until 1950. He was also an instructor in the Lowell Institute and in the Evening School of the Y.M.C.A. of Boston. He was a consultant for several companies and a member of the American Society of Testing Materials. He lived for many years in Newton Highlands and leaves a wife, Mrs. Caroline Vail Smith, a son William Vail Smith of Acton, a daughter Mrs. Estelle S. Nauman of Wilmington, Del., and six grandchildren.—**Elbert G. Allen**, 11 Richfield Road, West Newton, Mass.

'02

I experienced a peculiar sense of personal loss when I heard of the death of **Wade L. Wetmore**, II, which occurred in September 1966 at his home in Alameda, Calif. In my first year at M.I.T. I with five other Newburyport boys commuted daily to Boston on the B & M railroad

taking the 7:05 morning train made up in Newburyport. At the Hamilton-Wenham station Wetmore and Bert Haskell joined us having come in on the Essex branch. We made a very congenial group, and it got us acquainted early in our freshman year. Wetmore prepared for M.I.T. at the Essex and Gloucester High Schools. After graduation he was employed as draftsman or assistant engineer by several firms in the Middle West, one of which was the Allis Chalmers Company, mining department. After this he apparently became much interested in mining and served many mines in Utah and northern California in an engineering capacity. About 1913 he entered the employ of the Granby Consolidated Mining, Smelting, Power Company Ltd. at Anyox, B.C. He remained with them for ten years and then resigned to take a much needed rest. He took up work again in California with mining and oil companies. At the time of his retirement in 1950 he was with the Union Oil Company of California. He wrote me that since that time he had lived in Alameda except for many sight-seeing trips. He married Mabel W. McTaggart in 1919, and she survives him as do a son and several grandchildren. Wetmore was much interested in fraternal organizations and had received several years ago the 50-year medal in both the Blue Lodge and Royal Arch masonic orders. The passing of Wetmore leaves **Al Lombard** the only '02 man in California, and the geographical distribution of the others may be of interest. There are five west of the Mississippi, namely **Arthur Nichols** in Minnesota, **John Marvin** in Colorado, **Benjamin McKechnie** in New Mexico, **Lombard** in California and **Alberto Madero** in old Mexico. There are four in each of New York and Florida; two in each of Pennsylvania and Maryland and one in Washington, D.C. New England is the home of 26 of which 18 are in Massachusetts.—**Burton G. Philbrick**, Secretary, 18 Ocean Ave., Salem, Mass. 01970

'03

Your Secretary has recently endeavored to adopt a new design for our matrix of class notes, since the long desired photos to accompany our living classmates' biographies has recently been granted by the Review Editors. However, in the recent passing of our distinguished classmate, **Andrew H. Hepburn**, IV, February 28, our desired order is disappointingly reversed to extol the proud achievements of Andrew in his obituary. Andrew Hopewell Hepburn was born in Catasqua, Pa., on March 6, 1880. His preparatory education was at Freehold, N.J., Institute and West Nottingham Academy, Colosa, Md. (1898-1899). He then entered M.I.T. and graduated with the Class of '03, IV S.B. After graduation he was an instructor at the Harvard Architectural Department for a short period. Andrew decided on his future career in business in 1906 and established the firm of Taylor and Hepburn at Norfolk, Va. In 1908 he returned to Boston and became associated

Happy Birthday

There are 28 Honor Roll birthdays coming in June, two for the 90th, 11 for the 85th and 15 for the 80th.

June, 1877—**ERRETT M. GRAHAM**, '05, on the 8th; **HERBERT R. STEARNS**, '00, on the 17th.

June, 1882—**CARLTON E. ATWOOD**, '05, on the 3rd; **JOHN N. BOYCE**, '09, on the 3rd; **JOHN F. ALTER**, '11, on the 4th; **RALPH HAYDEN**, '04, on the 4th; **WILLIAM G. ABBOTT**, '06, on the 8th; **ERNEST A. MINER**, '07, on the 11th; **WALTER P. REGESTEIN**, '03, on the 20th; **FREEMAN M. SCALES**, '06 on the 20th; **HENRY B. THOMSON**, '06, on the 24th; **FREDERICK W. FARRELL**, '04, on the 28th; **JAMES R. STEVENSON**, '10, on the 28th.

June, 1887—**JOHN G. AHLERS**, '10, on the 7th; **FREDERICK W. OSBORN**, '10, on the 10th; **CHESTER L. DOWS**, '12, on the 12th; **SEDGWICK SMITH**, '11, on the 12th; **YGNACIO S. BONILLAS**, '08, on the 15th; **ALAN F. EDGE**, '08, on the 16th; **GEORGE T. PALMER**, '09, on the 17th; **ERNEST L. PATCH**, '10, on the 21st; **WILLIAM M. SCHOFIELD**, '10, on the 21st; **EDWARD P. CHAPMAN**, '09, on the 23rd; **FRANKLIN T. TOWLE**, '08, on the 23rd; **CARROLL R. BENTON**, '10, on the 25th; **HERBERT L. JENNESS**, '09, on the 25th; **BENJAMIN W. PEPPER**, '09, on the 27th; **MORRIS W. HEDDEN**, '10, on the 30th.

with the firm of the late Guy Lowell from 1912-1917. Andrew then formed a partnership in 1918 with the late Thomas Mott Shaw and in 1923 was joined by William Graves Perry, IV '07 S.B., under the name of Perry, Shaw and Hepburn. From then until his retirement in 1963 he remained with this partnership. During the busy career of this notable group they completed a long list of civic, college and university buildings. They designed the restoration of a section of Newcastle, Del.; the Industrial Village in Bridgeport, Conn.; they were the consulting architects of the subsistence Homesteads Division in Washington, D.C., and were directors of Small Homes Architects Associates of Boston. Also included in their works were the Jordan Marsh store downtown and the historical restoration of St. Stephen's Church in Boston's South End; Wellesley High School; Bulfinch Hall at Phillip's Academy, Andover, Mass.; Brown University, Providence, R.I.; Marietta College, Marietta, Ohio; Kresge and Aldrich Halls, Harvard Business School; and several buildings of Radcliffe College. However the most notable of Andrew Hepburn's architectural achievements was the renowned historical restoration of Colonial Williamsburg, Va., under the aegis of John D. Rockefeller, Jr., in 1927. This project has now become a national shrine for all historical devotees of our nation. In this huge artistry, it has been said, Mr. Hepburn and his Mott Shaw were Damon and Pythias; their joint endeavor as artists in drawing, water colors or etching were extraordinary gifts in accomplishing this masterpiece of reproduction. Andrew H. Hepburn was a Fellow of the American Institute of Architects; a member of the National Acad-



Andrew H. Hepburn, '03, taken in 1935

emy of Design; a member of the Marine Historical Association of Mystic, Conn.; and a member of Marine Association of Salem, Mass. Andrew Hepburn, or "Hep" to his close associates, had other extraordinary gifts. His personal charm was captivating, and though reserved was companionable. He was active in the Union Club; St. Anthony Club; Century Associates and Tavern Club where his sketches of members often took the form of kindly caricatures with appropriate anecdotes. He had a flair for sports during his busy career, being a good athlete—golfing in the 70's, a rugged skier of the old school and an excellent horseman. He leaves his wife, Rosamond White, and son, Andrew Jr. Also, architect memorial services were held in the Chapel of Trinity Episcopal Church and Sleepy Hollow Cemetery, Concord, Mass.

Our Councillor, **Ike Atwood, II**, is now home from another extended tour abroad during the past winter with Mrs. Atwood, an avid traveler. . . . **James W. Welsh, VI**, has a new address, 500 Osceola Ave., Winter Park, Fla. . . . Our birthday greetings to **William C. Twieg, V**, of Denver for his 90th milestone March 14 and **Georgé H. Garcelon, VI**, of Longmeadow, Mass., for his 85th on March 26. . . . Our deceased members are **Louis W. Graves, IV**, December 28 at Buffalo, N.Y., and **Ralph C. Jordan, II**, June '66 at Columbus, Ga.—**John J. A. Nolan**, Secretary, 13 Linden Ave., Somerville, Mass.; **Augustus H. Eustis**, Treasurer, 151 State Street, Boston, Mass.

'04

A note from the Gardner, Mass., Rotary Club tells us that a Happy Birthday was sung for the youngster of the club, 86-year-old **Harry Kendall**, whose birthday was March 16. Harry is still active in business and seems to be enjoying very good health. More power to you, Harry. . . . **Frank Davis** wrote me of the death of **Clifford Dewis**. In his note he called my attention to the fact that Walter Hadley, **Currier Lang**, **Reggie Wentworth**, **Ralph Hayden** and Clifford Dewis as well as Frank Davis came to Tech from Cambridge Manual Training school. They were all active members of our class and a great credit to M.I.T. . . . We have a press clipping concerning the death of Andrew H. Hepburn who received his degree with us but was affiliated with '03. He was 86 years old. Survivors include Mr. Hepburn's widow and a son. His architect-

tural firm, Perry, Shaw & Hepburn, took a major role in the restoration of Colonial Williamsburg, Va. During a career of 50 years he had a leading share in the design of a number of educational institutions as well as in restoration projects. After the restoration of Williamsburg, he helped carry out another colonial restoration at New Castle, Del. He was known as an artist. His etchings and water colors were exhibited at a number of shows in Boston.—**Eugene H. Russell, Jr.**, Secretary, 82 Stevens Road, Needham, Mass.

'05

So many of my classmates in sending me news have asked, "What about you? What do you look like? What are you doing?" etc., that I have decided to abandon my natural modesty and come out from under the bushel basket. I think you will find my picture above (or below). I am hale and hearty (considering); at least that's what my doctor meant when he said last December after a physical, "Aren't you ever going to grow up?" I think your questions can best be answered by repeating what I tell my friends who are still in the city when they ask me, "How do you manage the boredom up there in the sticks?" Here's how. For three years, up until last year, I was chairman of the local Arts and Crafts (with the highest sales in New Hampshire of all the summer shops). I was treasurer of the Sandwich Bicentennial Committee, vice-president of the Sandwich Old Home Week Association for two years, am now recording secretary of the Sandwich Historical Society, for the seventh year I am fund director for the Red Cross in the towns of Sandwich and Moultonboro. For six years we topped every chapter in New Hampshire in percentage of quota. I attend the Masonic meetings regularly, also the Grange and Men's Club. In my spare time I take care of a good sized vegetable garden and several flower beds, specializing in roses. During the winter I snow-shoe, ride a "skidoo," fish through the ice and shovel off the steps. Sounds like a book **Willard Simpson** I gave me titled *Texas Brags*. Ruth is in good health, considering that she has had to learn to live with three types of arthritis and a few other things. Nevertheless this does not prevent her from riding her several hobbies with much enthusiasm. We celebrated our 45th wedding anniversary in March. Have five daughters, four married, and nine grandchildren. We hope to see you on our 62nd Reunion on Alumni Day.



Fred W. Goldthwait, Secretary '05

A news item in one of the Boston papers carried this obituary of **John C. Damon, VI**, whose death was reported briefly in the May issue: "A memorial service for John C. Damon, 84, retired electrical engineer and inventor, will be held at 2:30 p.m., March 11, in the First Unitarian Church, West Newton. He died March 8 at his home in Closter, N.J. A native of Concord he was a 1905 graduate of the Massachusetts Institute of Technology where he taught for a year upon graduating. His career took him to Illinois, Idaho, Colorado and Utah before World War I during which he served in the Army Engineering Corps. After the war he worked in Pennsylvania, then with the Stone and Webster Company of Boston from 1922 to 1924 and then for the next three years with the American Brass Company of Waterbury, Conn., where he invented machinery for turning wire into cable. He next worked for Jackson and Moreland Company in Boston before going to Washington to work for the Public Service Commission and then the Security and Exchange Commission. From 1941 to 1943 he was back with the Army Engineers attached to the Undersecretary of War's office. He left the service as a colonel. He also served as special assistant to the president of the Hartford, Conn., Electric Light Company and in 1947 was re-hired by Jackson and Moreland. He retired six years ago after working for the State Department in Korea. He was a member of several associations including the Boston Society of Civil Engineers. He leaves a son, Merrill M., of Closter, N.J."

A letter from Mrs. Joseph Daniels of Seattle, Wash., contains this obituary: "**Joseph Daniels, 82**, a retired professor of mining engineering and metallurgy at the University of Washington, died January 20 in a nursing home. Professor Daniels was born in New York City. He was graduated from the Massachusetts Institute of Technology and received his master's degree and professional engineer of mines degree from Lehigh University. In 1911 he joined the staff of the Mining Engineering and Metallurgy School at the U.W. He also served as consulting engineer for the Bureau of Mines and did private consultation work. Professor Daniels was considered an authority in Washington on natural resources. He was author of 53 books and technical papers. After retiring from the U.W. when he was 65, he went to Lahore, India, where he established a School of Mines. He returned here about two years later. At the U.W. he was active in extracurricular work, serving as chairman of the public exercises for 25 years. He helped found the Engineering Council and served as adviser to the Mines Society. Professor Daniels was a member of numerous professional and honorary societies including the American Institute of Mining, Metallurgical and Petroleum Engineers, the American Society for Metals, the American Society for Engineering Education and Tau Beta Pi and Sigma Xi, honoraries. He was a fellow of the American Association for the Advancement of Science. He was a member of the Masons, Oval Club, Explorers' Club and Acacia

Fraternity. Surviving are his wife, Gladys Fletcher Daniels, and three daughters, Mrs. Ruth Wienker, Seattle; Mrs. Charles S. Prideaux, Bothell, and Mrs. Joseph Gayman, Anchorage." . . . Following a long illness, which I have reported previously, **Courtlandt W. Babcock** died at the Phillips House, Boston, on March 26, 1967. Thus the class loses one of its finest and most devoted members. He came to M.I.T. after graduating from Yale. He was with Westinghouse for much of his lifetime, holding executive positions. He and Elizabeth were constant attendants at our reunions. Ruth and I have tried to be a bit of support to her in the long terminal sickness, and she has been wonderfully understanding. We shall miss them. . . . **Frank H. Langworthy, II**, died on March 3, 1967. He was an associate member of the Alumni Association.—**Fred W. Goldthwait**, Secretary, Box 32, Center Sandwich, N.H.

'06

Since the May notes were filed a month ago, not even a post card came in until the day before these notes were due, when a long letter arrived from **Gene Fogg**. He and Lynne were then enjoying fine Florida weather at their usual winter resort at Indian Rocks Beach. They planned to leave April 21 by auto and make the long trip to Portland, Me., the way everyone should, especially at our age. "We shall make it a leisurely trip of 250 to 300 miles a day which will be six days of travel. A leisurely journey is not only safer on congested highways but, of course, less tiresome. With the low daily mileage we take an hour or so for lunch at a Howard Johnson's or some other place and get to our motel by the middle of the afternoon. If the weather is good we stay over a day at Myrtle Beach, N.C." Although he didn't say so, I suspect that the Fogg's don't always take the same route, thereby seeing different country, different scenery, different towns and villages. In his letter Gene enclosed a striking color postcard of the singing peacock "Chang," a famous resident of the exotic Tiki Gardens at Indian Rocks Beach. . . . The day after these notes were due at the Alumni Office, I learned in a roundabout way of two deaths. In a letter from **Bill Abbott, VI**, he said he had received a letter from the son reporting the sudden death on March 17 of **Michael Joseph Gibbons, Jr., VI**, in Dayton, where he had resided and been in business since Tech days. More details and his career in the July notes. That same evening we had a phone call from Helen, sister of **Guy Ruggles, III**. She had been told by Guy of the sudden death on April 12 of **Harold Cleveland Plummer, III**, in Phoenix. He had been quite blind for some years and in the care of a competent housekeeper-secretary since the death of his wife in 1953. More details of his career in the July notes. . . . Alumni Day is June 12 (Monday) this year; see you then?—**E. B. Rowe**, Secretary-Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181

Deceased

FRANCIS P. SEARS, '90, November 29
WILLIAM R. COPELAND, '93, March 21
J. THOMAS F. GLADDING, '00, 1965
LAWRENCE S. SMITH, '00, March 19*
ALBERTO P. GONZALEZ, '01
EMANUEL GORFINKLE, '02, April 17
ANDREW H. HEPBURN, '03, February 28*
COURTLANDT W. BABCOCK, '05, March 26*
FRANK H. LANGWORTHY, '05, March 3*
MICHAEL J. GIBBONS, '06, March 17*
HAROLD C. PLUMMER, '06, April 12*
JEAN P. VARIAN, '06, October 25, 1965
ANTHONY B. ARNOLD, '07, April 15
DANA W. CLARK, '08, January 8*
W. STUART GORDON, '09, August 26*
F. GARDINER PERRY, '09, April 23
MAURICE R. SCHARFF, '09, April 6
JOHN C. TUTTLE, '10, January 4*
JOHN P. MINTON, '12, February 20
ROBERT D. BONNEY, '13, April 5*
HERBERT W. ANDERSON, '15, March 27
JOHN H. O'BRIEN, '15, April 20
JOSEPH FARHI, '16, February 24
ALBERT R. MUMFORD, '18
DAVID N. RUBIN, '18, February 1
RICHARD B. STEHLE, '19, February 20
Mrs. BRUCE O. BUCKLAND, '20, March 5
WITOLD W. KOSICKI, '20, April 6
C. ARTHUR NEWTON, '21, January 18
JAMES A. BOWERS, '22, March 13
DANIEL J. REED, '22, 1966
JASPER WILLSEA, '23, March 9
PHILIP E. GRUBER, '25, March 1
PASCAL J. MORELL, '25, February 14
EDWARD O. HOLIEN, '26, March 24
WILLIAM B. MAYER, '26, September 10
LESTER W. SCHOENFELD, '26, March 11
HOWARD BIRS, '27, March 17
GILBERT SMILEY, '28, April 4*
WILBUR N. LANDERS, '30, 1965
GEORGE J. BRADY, '32, May 19, 1966
ROBERT W. WRIGHT, '32, September 23
EDWARD W. PALMER, '33, June 1966
ROBERT M. BECKER, '34, March 23*
OLIVER S. MEIKELL, '35, March 15
JOSEPH BAYER, '39, October
F. LEIGH NOYES, '40, March 11*
ARNOLD SMITH, '40, November 20
ALFRED FURTEK, '41, September 1
FRED W. WILLS, '49, February 15
WILLIAM H. NELSON, '53, November 4
CARLOS X. BARROSO SALAZAR, '57, February 25

* Further information in Class Notes.

'07

In the March 1967 Technology Review on Page 77 there are a number of sketches illustrating some of the latest doings of the M.I.T. Alumni. As noted in the heading, "Some of the information as given in the Class Notes warrants a wider audience than the classmates for whom they are written." At the top of the page is a sketch of our **Milton E. MacGregor** climbing Mt. Washington on his 82nd birthday. This page will go into the 1907 archives. . . . A letter from our Assistant Secretary, **Tom Gould**, informed me of a serious operation last February that kept him in the hospital three weeks. Tom has now decided to retire completely. He has closed his engineering office at

177 State Street, Boston, and will join many of the rest of us on the sidelines as we watch the rest of the world go by. At present he is doubtful about attending our 60th Reunion in June; but as that is still two months away, he may be able to make it. . . . **Willis Waldo** writes to me from Panama City that he has been there for quite some time working on some mining projects that look financially interesting. If any of the '07 men are stone collectors, write to Willis. He always uses interesting postal items on his mail. . . . One change of address has come in this month—**Arthur O. Christensen, III**, from 1509 Pigeon Point Road to 1905 on the same road in Beaufort, So. Carolina 29902. . . . As the June number of the Review will probably not be delivered until after our 60th Reunion, I will not include any Reunion information in this set of notes. Right now it is expected that 15 to 20 of the '07 classmates may attend. . . . This is the 2nd consecutive month of class notes without any obituary notices of '07 classmates.—**Philip B. Walker**, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass.; **Gardner S. Gould**, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

'08

The second dinner meeting of the 1966-67 season was held on Wednesday, April 12, at the M.I.T. Faculty Club at 6:00. Some of our regulars were still in Florida, but the following showed up: **Bunny Ames**, **Bill Booth**, **Nick Carter** and **Ted Joy** and Mrs. Joy. We met in the cocktail lounge and while enjoying our favorite tonics and crackers and cheese from the club buffet, talked over the happenings of last winter. About 6:30 we adjourned to private dining room 4 for the usual delicious dinner. We had no movies so adjourned early. Our next get-together will be our 59th Reunion at Melrose Inn, Harwichport, Mass., June 9, 10, and 11. We are sorry to report the death of **Dana Clark** of Andover, Mass., on January 8, 1967.—**H. L. Carter**, Secretary, 14 Roslyn Road, Waban, Mass. 02168; **Joseph W. Wattles**, Treasurer, 26 Bullard Road, Weston, Mass. 02193

'09

We regret that there were no notes in the last two numbers of the Review but, try as we might to obtain class news, we were unsuccessful. In the March 1966 Review we told of **John Davis** being president of the Cambridge Water Board and that he had received high commendation for having written a detailed history entitled "Life Story of Cambridge Water," which he submitted as a report to the Board. We summarized the report in the earlier Review. On January 22, 1967, he presented this "Life Story" at a meeting of the Cambridge Historical Society, where it was well received as being not only interesting but instructive historically. John stated that water in Cambridge was never

a problem for there was always a plentiful supply. He reviewed the sources of water from the wells and brooks of the early settlers as they developed into the present extensive system which includes Fresh Pond in Cambridge, Stony Brook Reservoir in Waltham, and the large Hobbs Brook Reservoir in Lexington and Lincoln, as well as an emergency tie-in with the Metropolitan Water System. . . . We have received a letter from **Lockwood Towne** who lives in Brookfield Centre, Conn., in which he enclosed his biographical data. He states: "It has always been a source of great regret to me that I seemed never to be able to keep up with Technology affairs including our class reunions. The last one I attended was in 1959 at Chatham. It was a memorable occasion for me. My wife and I are, to use that old cliché, as well as could be expected. Which reminds me that as I was being fitted for an orthopedic support for my back and grumbling a little over the pangs of age, the technician looked up, congratulated me on my appearance of health and asked my age. When I told him, he simply said, 'What are you kicking about?' I decided that was just what I needed and am trying to behave accordingly." Lockwood was born in Crawfordsville, Ind., the son of a Methodist Episcopal minister who was treasurer of DePauw University from which Lockwood graduated in 1905, Phi Beta Kappa. After graduating from the Institute in civil engineering, he spent a few years in teaching and practice and in 1917 joined Stone & Webster as a structural engineer. He remained with this organization until he retired in 1964 becoming successively chief structural engineer, consulting engineer, vice-president, director and construction manager, engaged in the engineering and construction of industrial plants, mainly in the field of electrical utilities in the United States and Canada. He served as president of and a consultant to the Danbury Hospital, was a member of the governing board of the Danbury Chapter of the American Red Cross, and after retirement served on the Second Hoover Commission on the Organization of the Executive Branch of the Government. Lockwood was married in 1909 to Helen M. Jones of Evanston, Ill., and has two children, Mrs. Merrill T. Hunt of the Walnut Hill School for Girls, Natick, Mass., and Dr. Lockwood Towne, psychiatrist and neurologist, Massachusetts State Hospital, Taunton and Fall River, Mass. He is a member of Phi Kappa Psi Fraternity, is a Fellow of the American Society of Civil Engineers, licensed professional engineer in numerous states including New York and Connecticut, a member of Riverside Church, Riverside Drive, New York. Lockwood and his children certainly have attained distinction. It would be helpful to the secretary if other classmates sent similar news concerning their careers.

It was with great regret that we received the notice of the death of **Robert (Bob) I. Hulsizer** at the age of 81 on December 25, 1966, at Largo, Fla. Bob was one of the very active members of Course VI, and we were all very fond of him. He was born in Bridgeport, Conn., and pre-

pared for the Institute at the Bridgeport High School. While at the Institute he was a member of the E. E. Society, the varsity and class cross-country teams. We have met him a few times at Alumni meetings and learned that he was a patent attorney. We have written to the widow expressing the sympathy of the class as well as our own. . . . We received a note from Mrs. John M. Hitchcock of Framingham, Mass., daughter of the late Royce Gilbert, telling the sad news of the death of her mother Victoria Gilbert on December 23 after a series of minor shocks. Royce died in 1960. The family has started a Memorial Fund at the Framingham Union Hospital. We have written Mrs. Hitchcock expressing our sympathy. . . . We have also received a notice of the death of **William Stuart Gordon**, Course II, who died in Buffalo, N.Y., on August 26, 1966, at the age of 80. He prepared for the Institute at Stevens Preparatory School and Princeton University. At the Institute he was a member of the Glee Club and the Tech Show. He was a former president of Roberts-Gordon Appliance Corporation of New York. He was an engineer and industrial leader in Buffalo for many years and made several inventions in automatic gas conversion burners. . . . Be certain to come to Alumni Day, June 12, to meet one another and to insure a sizeable representation of the class.—**Chester L. Dawes**, Secretary, Pierce Hall, Harvard University, Cambridge, Mass.; **George E. Wallis**, Assistant Secretary, Wenham, Mass.

'10

Jack Babcock informed me of the death of **John C. Tuttle** of Akron, Ohio, on January 4, 1967. Jack Tuttle and his wife were spending the winter in Naples, Fla., on the doctor's advice since Jack was very susceptible to flu and cold. Unfortunately he became ill on Christmas and died of peritonitis on January 4. He was born in Salem, Mass., and worked for Goodyear as a consulting engineer in tire development until his retirement. Jack Babcock also asked what your Secretary has been doing for the last month or two. Notes from members of the class have been so few that I have not been able to pass any news along. Therefore, in order that this month's notes will be a little more voluminous, I will relate what has happened to your Secretary. Early in March, **Waldo F. Pike**, '15, and his wife and my wife and myself took an eight-day trip to Nassau on the S.S. *Homer*. It was one of the finest ships I have ever traveled on. The sea was so smooth it was like a trip up the Hudson River. We had a very fine trip together. However on my return I went to the hospital for a check-up. I was there ten days, and they found that the only trouble with me was old age. I am now on a special diet. I notice in the Tech Review for the month of April that Happy Birthday greetings were given to **Russell Hastings** and **George Goodspeed** as they have reached their 80th birthdays. I am sure the class extends its best wishes to them.—**Herbert S.**

Cleverdon, Secretary, 120 Tremont St., Boston.

'11

When I agreed to take over as Secretary of the class, I had the job of Class Representative on the Alumni Council thrust upon me, and since then have attended more than half of the seven meetings a year that are held. In this capacity I had a letter from **Fred Lehmann**, the Secretary of the Alumni Association, asking me to get four or five members of the class to attend the next meeting as guests. I called a few of the local boys and got one, **Morris Omansky**, to go. From these calls I picked up the following bits of information. **Helen** and **Marshall Comstock** returned in April from a three-months stay in Clearwater, Fla. **Morris Omansky** received a 50-year certificate of membership from the American Chemical Society. **Gertrude** and **O. W. Stewart** spent the last week in April with their son **Pearson** in North Carolina. **Helen Richmond**, Carl's widow, spent the month of April in Hawaii with her son. If this set of notes is not satisfactory, write to **Obie**.—**Oberlin S. Clark**, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

'12

Bill Schmiedeke in reply to a letter from me has given me more of his present activities. After five years with various structural steel fabrication and erecting companies, he was for five years a bridge designer with the Big Four Branch of the New York Central. He then joined a small general contracting company, the Penker Company, Cincinnati, and in 28 years worked up to chief engineer and vice-president handling work all over the central West for various cities, counties and the federal government. He has three living sons, one an engineer with Douglas Aircraft, another a captain in United Air Lines and the third an architect in the Detroit area. In 1949 due to his wife's health he decided to move to California, and for the last 16 years he has been active with several construction companies on local projects. He attended the California dinner for President Johnson in January, and 1912 was also represented by **Leslie Duke**, **Paige Golsan** and **Bill Lynch**. I wish more of our old friends would be as generous in writing me. . . . Word has been received that **Larry Cummings** has remarried. As you remember, his wife passed away several years ago. . . . **Robert S. Cox** is now located at 14662 Pike's Road, Saratoga, Calif. 95070. . . . Another new California address is **Lea A. Weatherwax** now at 117 Misbro Way, Kenwood, Calif. 94542. . . . **John Lenaerts** has returned to Cape Cod from his winter stay in Florida and is now at Lilly Pond Garden Apt., Bayberry #4, Country Club Drive, South Yarmouth, Mass. 02664.—**Frederick J. Shepard, Jr.**, Secretary, 31 Chestnut Street, Boston, Mass. 02108; **John Noyes**, Assistant Sec-

'13

Our girl, **Marion Rice Hart**, is reported to be on the move again according to the *Boston Globe* Parade, March 26, 1967. . . . The result of a poll taken from the replies received with the questionnaire last fall shows that the preference of the 55th Reunion site is as follows: 26 for the Oyster Harbors Club, 9 for Cambridge, 19 for near Boston, 8 for either or any place, and 28 did not vote. Therefore, it appears that your Reunion Committee favors Oyster Harbors Club, and with our wives and sweethearts there is a possibility of 60 to 65 attending. We shall share the facilities at the club with the Class of 1923, which is former President Stratton's class. . . . It is with a very heartfelt feeling that we learned of one of our dearest and closest classmates, **Robert D. Bonney's**, death this week. Bob died April 5, 1967, at the Palo-Stanford Hospital in California at the age of 74. He was born in Wakefield, Mass. He attended the Wakefield public schools and graduated in 1913 from M.I.T. as a chemical engineer. Bob served the M.I.T. as a member of the instructing staff. He spent several years with the Bird & Son of Walpole, Mass., and then joined the Congoleum-Nairn Company where he remained until retirement in 1957, occupying several executive positions. As of his retirement he was vice-president of manufacturing and a member of the board of directors. Following his retirement he and Mrs. Bonney (whom he married in 1914) continued to live on their Greenhaven Farm, Elkton, Md., where he maintained a herd of black Angus cattle and carried on successfully considerable experimental research of local and foreign to locality plants, shrubs and trees. The Bonneys sold the farm and its livestock and appurtenances in 1966 and moved to 360 Forrest Avenue, Palo Alto, Calif. Bob lived a very interesting life, and was honored and respected by all who knew him. He was formerly president of many organizations including: Maryland Angus Breeders Association; Federation of Paint and Varnish Production Clubs; New York Paint and Varnish Club; as well as a director of the Societies for Paint Technology and the American Society for Testing Materials. Also he was a member of Lambda Chi Alpha fraternity and the U.S. Naval Institute. Bob Bonney is survived by his dear widow, Flora Imogene (Reed) Bonney, a son Reed Bonney of Ithaca, N.Y., by daughters, Barbara Clinton of Newton Lower Falls, Mass., and Emily Couper of West Orange, N.J., and by 13 grandchildren as well as three great grandchildren. A sister Lucy P. Bonney resides in Alhambra, Calif., and a brother Carroll T. Bonney in Palo Alto, Calif. Yes, we shall miss Bob at our future reunions. The Capen family has always enjoyed the hospitality of Bob and Gene, their letters plus their visits. . . . We know that you have received **Bill Brewster's** letter regarding the 1967 Alumni Fund. To you who have not contributed,

dig down in that old stocking or take the rubber band off that roll and send a donation to your Alma Mater. . . . Our apologies to **Dave Stern** for our poor eyesight for misspelling his great granddaughter's name. Although Dave retired as of last December, he is still receiving recognition as noted in the April Technology Review under the heading Individuals Noteworthy and we quote: "The Boston Rotary Club presented David Stern, '13, with its annual service award." As a member of the Canton Rotary Club and a frequent guest at the Boston Club, we gladly state that the award could not have been given to a more deserving fellow. . . . More autobiography: **Warren A. Gentner**, 98 Garden St., Hartford, Conn. 06105; wife, Edith E. (deceased 1963); children Robert W. Gordon, Mrs. Virginia Marshall Grosslin; grandchildren Robin Ann Gentner, Warren Robert Gentner, Robert Marshall, Mrs. Susan Marshall Vasey, Janis Gosselin; retired in 1961 as chief engineer, Water Bureau of the Metropolitan District, Hartford, Conn. . . . **Charles E. Trull**, 38 Armistice Boulevard, Pawtucket, R.I. 02860. . . . **Paul V. Cogan**, 276 E. Macada Road, Bethlehem, Pa. 18019; wife Aryle K.; have been active in civic affairs, active in sports but only as an observer, play a great deal of bridge. . . . **Philip V. Burt**, 4 Webfoot Way, Yarmouth Port, Mass. 02675; wife passed away; children Phyllis B. Hopkins; granddaughter age 13 years; after planning to retire for 10 years I finally did at the end of June this year. After handling the food service at Babson Institute since the middle 20's and feeding up to 450 boys, I am now doing the cooking myself for one. I had a comfortable little place built for me here on the Cape, and after I get my shop fitted out again, I expect to keep myself out of mischief. . . . **Robert J. Tullar**, 212 Wayne Ave., Lansdowne, Pa. 19050;

wife Beulah H.; children Jean L. Watson, Robert S. Tullar; grandchildren Barbara, Richard, Carol, Thomas, Carolyn, Anne. . . . **Arthur W. Kenney**, 1647 34th St. N.W., Washington, D.C. 20007; wife Marion L.; children Stephen C. Kenney, Sylvia W. Kenney; grandchildren Marianna Luiso Kenney; retired in good health. . . . **Thomas J. Lough**, 66 Farland Ave., Highland Park, Mich. 48203; wife Genevieve; children Mrs. Evelyn L. Montgomery, Thomas S. Lough; grandchildren 8. . . . **Charles W. Brown**, P.O. Box 402, Columbus, N.M. 88029; Helen M.; children William E. Brown, Richard T. Brown; grandchildren William E. Jr., Cynthia, Elaine, Stephen; play organ, take pictures, repair everything, take it easy, take trips to see children and write to you. "We have had a rather rough time this summer, but things are better now. We visited son Richard, wife and four Brownies in Eugene, Ore., in May, taking two weeks for the trip of about 3100 miles in all. We both had a little lameness in legs during the trip, probably pushed along too fast. On return our osteopath fixed the legs, but Helen came down with pain in the ribs area, had a course of penicillin and seemed better. Then she came down with two more attacks of the same up to July 26. Our doctor having had his 2nd heart attack, I had to get another and he placed her into the hospital saying endocarditis. She improved but couldn't get enough rest in the busy hospital, so I have nursed her since August 1 and all seems well now. We hope to go to Bill Browns for Thanksgiving, a much shorter trip than Oregon, and no small fry to keeping things popping. We had a good summer as to weather, with only 6 days of 100 degree temperature. It is easy to keep comfortable here in this dry climate, although we had more rain than usual, with relative humidity up to 50% for weeks.

At a Republican Party workshop at Dedham, Mass., George Philip Capen, Class Secretary of '13, was honored with an award for 50 years of service to the Republican Party. The citation, signed by Governor John A. Volpe, was presented in behalf of the Governor, the Canton Republican Town Committee and the Republicans of Norfolk County. Taking part in the presentation are, left to right, Senator John M. Quinlan, chairman of the Norfolk County Republican Club; Senator Leslie B. Cutler, dean of the state legislators; Mr. Capen; and Edward Colby, chairman of the Canton Republican Town Committee.



Now a fine bright cool fall day and comfortable. Hope you and the boss are the same. Best regard to all, Charlie Brown." Well, that is the end of the lesson but more next month.—**George Philip Capen**, Secretary and Treasurer, 60 Everett Street, Canton, Mass. 02021

'14

There is a story of a triumph behind a tragedy; and who knows it better than the one who has been left behind. "My dear Mr. Affel: my husband, **Ferdinand Arnold Chandler** of 41 Wall St., Wellesley, Mass., passed away February 24, 1967. He was 76 years old. A native of New Haven, Conn., he was graduated from M.I.T. with the class of '14, Course IV. He was a member of the Architecture Society, Technique Board, Art Staff and Lambda Chi Alpha. He was president of the Chandler Construction Company, with offices at 45 Newbury St., Boston, for 33 years. He retired because of poor health in 1954. He is survived by his wife, Jane (Chase), a daughter, Mrs. Michael Kalin, two grandchildren, and a brother Edward C. Chander of New Haven, Conn. We observed our 50th wedding anniversary June 2, 1965, and attended the 50th reunion at M.I.T. June 1964. We have been residents of Wellesley for 25 years. Chan, as he was known to his classmates, had many friends in Architecture IV, Barker, Faunce, Fowle, Harlow, Luce, Sniess, Tallman and John Wood to name a few. So many have passed away also. We both enjoyed your notes in the Technology Review. Best wishes for the future. Sincerely, Jane C. Chandler." . . . Since you are receiving this in vacation time, we cannot help passing along some of the information telling about the present status of the **Frank Atwoods** resort emporium at Edgartown on Marthas Vineyard. This includes the original Town House, as well as the Katama Shores Motor Inn with rooms and apartments of various sizes to satisfy most any family, all on the waterfront. He mentions a few Tech men including **Paul Owen** whom he sees in the summer and says that otherwise he is surrounded by Harvard, Yale and Princeton men, which of course sounds pretty awful. So let's organize a "Let's Save Frank Atwood" Club. We might add that his address is Atwood Realty Trust, Box 1098, Edgartown, Mass. 02539.

Alden Crankshaw, Course X, died on February 20, 1967, at his home 2847 Military St., Port Huron, Mich. His widow, Bertha M., reported his passing. His professional life included an early connection with the Aetna Explosives Company in New York City. Most of his active life, however, was spent with the Acheson Colloids Corporation of Michigan, initially as sales representative and later as service manager in New York City. We had many classes in common with Alden and knew him well. Our deepest sympathy goes to Mrs. Crankshaw and her family. . . . Recently inaugurated M.I.T. President Johnson has made appearances and given talks to various organizations such as Tech Clubs around

the country. While we had met him previously, we heard him talk only recently at an Alumni Council meeting. If you have not heard him and have an opportunity please, we urge you, do so and add a few years to your life, mentally speaking. Learn what M.I.T. is all about. His talk is a "Head Start" program for the 70-plus club. . . . **Harold Johnson Danforth**, Course VI, died on January 12, 1967, according to information passed along by his daughter. He married Mildred Smith in 1918, and there were three daughters and one son who survive him. He had a productive professional career, mostly in the communication business in this country and abroad. He spent some time with the AT&T Company in New York, then later with the IIT Company where his interests took him to Buenos Aires, Argentina, and Santiago, Chile. On return from these foreign assignments he spent several years with the New Jersey Bell Telephone Company. Later he served with the Public Service Commission of New Jersey. He spent several years with the Conversaphone Company in New York City. In 1948 he returned to South America, Rio de Janeiro, for a brief assignment. The last professional connection of which we have record was as a communications engineer employed by the National Scientific Laboratories, Inc., of Washington, D.C., assigned to Griffis Air Force Base, Rome, N. Y. He retired to Absecon, N.J., where he had lived previously. We knew Harold well as a Course VI member and also as a not-too-distant neighbor when he lived in New Jersey. Our deepest sympathy to his family. . . . As the beginning of these notes indicates, we have had interesting correspondence with the widows of some classmates. Perhaps that is because the last few reunions have included wives, and they feel they are now properly a part of the 1914 family. We wonder whether it would be possible to induce some wives of '14ers who are living to tell of the doings of their somewhat reticent and presumably accomplished husbands. We promise not to tell.—**Herman A. Affel**, Secretary, Rome, Maine; Mail: RFD 2, Oakland, Maine 04963

'15

Many thanks to you supreme classmates for your ready and generous response to class dues. At this writing (April 15) 45% of our entire mailing list have paid an average of \$8.25 per man. Nice going. And here are some fine, newsy and interesting notes that came with the checks. **Phil Alger**: "I trust you had a delightful cruise, and anyway you have escaped a lot of Boston snow. We are going to hear President Johnson speak before Freedom Forum, and also attend a Tech dinner on February 20. It appears he does not admit knowing anything about labor relations, but I hope to get some ideas from him. I am gradually regaining strength, but it is a long road. The latest milestone is that my doctor said I am not to have any more sympathy. He also remarked that I have committed a grievous error by having had too many birthdays! I sent a card to

George Rooney and hope he is doing well." . . . **Dick Bailey**, Philadelphia: "I look forward to seeing you in New York City at the Class of 1915 Reunion this spring. It was a good move to advance the time of this reunion from winter to spring. I hope that Pirate Rooney will be present. We would surely miss him. You asked me in the P.S. of your letter to answer this question, 'If you're retired what are you doing?' Right now I am answering your question! I am semi-retired and go to Amchem Products in Ambler, Pa., three or four times a week to be of a little help to younger men who have taken over my job. No news about my family that is worth printing, so I do not expect to see my name in the 1915 news. You do such a very good job as Secretary of our class that no other Class Secretary of M.I.T. can surpass you. One more thing, no stories from me over at New York City without your permission. So don't worry about air pollution from me." . . . I judge from **Doug Baker's** letter, following, that he too has been in the hospital for surgery. Too bad we did not know it at the time. But we wish him now all the best. We hope to see them in East Middlebury, Vt., next summer. "Oh yes, I am retired all right. Now that the Salisbury town books are more or less audited and the town report is printed, what I am doing mostly is waiting for Medicare and the New Hampshire-Vermont Blue Cross-Blue Shield "65 plan" to decide if my forms SSA 1490 are made out OK. Then maybe they will send me a nice check toward medical expenses for my surgery in December. Also I am beginning to take on some of the jobs which Elizabeth has been doing the last two or three months while I rested in the hospital in December, like making footpaths in the snow (only I do it with a tractor while she, poor soul, used a snow shovel)." . . . **Joe Barnwell**, Columbia, S.C.: "I am building a big bridge over the Great Pee Dee River northeast of Florence, S.C. I have a wife, three daughters and ten grandchildren, all doing fine." . . . **Frank Boynton** sends regards to all from Pasadena. . . . **Sam Berke**, with his wife Evelyn have been in Miami away from February's bad weather at their Lakeville, Conn., place. This means Sam is feeling better, which is good news to us all, and will be at the New York dinner April 21. We'll all be glad to see him there. . . . You could easily guess this letter is from none other than **Bill Brackett**. How he continues that long hard driving schedule is beyond understanding: "Your dunning letter is so well worded that I have broken down and am attaching a check for the dear old class. I haven't heard anything more about the Pirate's health since getting your note about the hospitalization. I hope he is out by now. As you know, I still am covering New England, putting almost 1000 miles a week on the car. A 300 mile-plus day is nothing out of the ordinary, while you think you are enjoying yourself on various decks and not having the conveniences of home. Of course, we only have two great grandchildren. If it were not for Frannie, I doubt if I would write to you anyway. But I do think the Class of 1915 has been blessed with the best Secretary of any

class at M.I.T. (Pull your hat down)."

... **Whit Brown**, wintering near Brandenton, "I have enjoyed hearing from you this winter, but feel badly that I have not responded sooner; it is peculiar that when one is down here with nothing special to do, nothing much gets done! I was sorry to hear about Chet Runels, and I will surely write to Mrs. Runels. Yes, I was glad that we saw him at Speed's funeral. How is **Reggie Foster**, and did Pirate come through all right? We have had a very good winter down here, but it has not been as easy to get unwound as it used to be. Driving down was much less fun than it had been before. We bought a house of our own about the middle of January. The house has a good heatilator fire place which we enjoy very much, although a central gas heating system is very effective. I haven't traveled around very much but hope to get up to Clearwater to see **Herb Whitcomb** who is there for a while, and probably see **George Urquhart** in Largo at the same time." ...

Orton Camp: "Am still working full time, and am very busy. I am looking forward to getting away for a couple of weeks in March. Fortunately I like winter and so quite enjoyed the snow storm we had last week. The plow does the driveway so only a few feet of sidewalk are left for me to tend to. I am sure I wrote you after our 50th to tell you that Miriam and I had a wonderful time at the Alumni luncheon and were so pleased to see so many classmates who looked so well. I expect and hope to go to my 55th at New Haven this spring." ... **Findlay Downs**, now here's a man for you: "I am retired and writing my autobiography—some job. I sail my 36-foot cutter *Bosunbird* around Cape Ann (Mass.) and cruise to Maine now and then. On July 11, 1967, I'll be 80 years old." ... **John Dalton**, Providence: "I have signed up for another year of golf. Do hope my legs and back hold up. It grieves me to read of the passing one by one of our classmates. Whether we like it or not, we are approaching the omega of our existence. But like you and others, I am going to make the best of it while I am here. I sent George Rooney a card and do hope he is recovering. With all good wishes to you and Fran." ... **Jerry Coldwell**, enjoying Naples, Fla.: "I wrote George Rooney and hope he is better. I expect to see **Fors Purinton** here soon. What am I doing? No change!" ... Here's a good idea from **Fritz Coleman** for enjoying your life! "I have been retired over nine years and have been having the time of my life doing nothing, and not enough time for that. I recommend retirement to everybody from birth on." ... Here's a fine letter from **George Easter** in Buffalo. It's nice he and Ben can get together out there. "Here is your periodic contribution. With you doing such a nice job of running the show, that is the least the rest of us can do. We had **Ben Neal** over for dinner recently and had a look at my slides from Coonamessett plus our last winter's Hawaiian trip. I saw your letter to Ben from which it appears you are also taking a bit of sunshine. More power to you! Well we proved we are nuts or rugged or something by spending most of November and part of December in Florida and then go-

ing to Northern New York to spend Christmas! And it was the most beautiful Christmas we ever had! Christmas Eve we had a foot and a half of nice fresh snow out in the middle of the big evergreen woods, and it was gorgeous. Our son has a nice warm house there where we holed up most of the time, but the day before Christmas we visited our summer home on a lake four miles away. There we found the temperature 9 above zero in our living room so we quickly rushed out to get warm. Buffalo has missed the big snows this year, thank goodness, and until the last ten days did not even get very cold. Our local ski resorts complain a bit but us old fogies prefer it this way. Drop in if you get out this way and we will fix you some anti-freeze, summer or winter. Margaret joins in best regards." ... We were all so glad to see **Ellis Ellicott** at our 50th: "As to my retirement, this will be complete in a matter of weeks, but I am trying to write a history of the Ellicott Machine Corporation and it is slow going, so I suppose I will be fooling around with this for some time thereafter. We are just taking off for a vacation of about a month in Italy and the Eastern Mediterranean, and are hoping to get away from some of this snow and cold." ... Helen and **Otto Hilbert** surely get around. Writing in the middle of February Otto says: "Helen and I are enjoying Corning's [N.Y.] snowy and icy month by visiting in Southern California. The weather here is beautiful, lovely sun and many flowers. The surrounding country is most scenic and we take many beautiful rides. We have been here since the middle of January and will probably stay another four weeks. In May we leave on the *United States* for the Rotary International Convention in Nice and later will go to West Germany with some friends and finally visit some relatives in East Germany whom we have never seen. After the convention we are going to Denmark and Finland and take the North Cape cruise out of Bergen to see the fjords and the midnight sun. We return home in June on the *Gripsholm*. We hope Frances and you are both well." They are going to have a fine trip, and from our own cruise up to the North Cape we know they will be impressed by the breathtaking scenery. The *Gripsholm* is one of the finest ships we've been on. ... I hope these strange Latin words that **Dave Hughes** used don't mean anything bad: "Your touching letter received. What have I been doing? Having exhausted the possibilities of cymbidiums and cypripediums, we are now madly engaged in a Bromeliaceae project involving mostly the epiphytic varieties. All this is of course in addition to the annual rush to get farm accounts closed and get income tax returns in order." Some people make a terrible problem out of life; but would it not be terrible to wake up in the morning and say, "I wonder what I can do today to pass the time away?" ... Helen and **Boots Malone** invited us to share the fine weather in Sarasota with them. We wish we could have, for we returned from our cruise just in time to get the winter's worst storms and weather here in March. Ah, me! ... **Doug McMurtrie** hibernates between Or-

lando in the winter and Gorham, N.H., in the summer. ... Here's a splendid letter from **Herm Morse**: "As I think I reported some time ago, I retired at 68 December 1, 1961, after 46 plus years with Good-year, during which period I had the fun of seeing it grow from annual sales of a little over \$50,000,000 to over \$2,000,000,000. Sales on the report coming tomorrow for 1966 should be 2½ billion. Since retiring I taught two classes at Kent State in business administration for a 10-week quarter while a sick professor was recovering. I probably could have stayed on, but I didn't want to be confined. I have since served for about 4½ years on the Business Advisory Council to the Business Administration College. In 1962 following the teaching that was over in late March Marjorie and I drove around Florida, down the East Coast and up the west side to Treasure Island, St. Petersburg. That summer we went by train to San Francisco, to the World's Fair in Seattle and back through Canada stopping at Banff and Lake Louise. In 1963 with our older daughter, her husband and two children we flew to London, toured quickly through England, Holland, Belgium, Switzerland, Luxembourg, Italy and France and came back on the *Rotterdam*. In '64 we did the same with the younger daughter, but our trip after England and Italy ended in Switzerland when Marjorie had lung embolisms from clots from varicose veins. Thanks to good doctors and wonderful nurses she recovered, and we came back on the *Rotterdam* as planned but had to skip Denmark, Holland and most of France. In 1965 as you know I got to our memorable 50th with Marjorie after which she had a vein operation. Last October 31st (1966) was our 50th wedding anniversary which we celebrated early because of school and all 10 of us, the two daughters and their families, went to Banff and Lake Louise in late August. In December '66 Marjorie and I again on the *Rotterdam* cruised to Nassau, St. Thomas, St. Croix and San Juan from New York. On the more serious side of life I continue on the Advisory Committee at Kent State College, audit the church accounts, do a little on the United Fund and on the Masonic Temple Building Board. For the last two years a small group of retirees, six to nine a day, have been meeting at the Mall daily at 10 and walk two miles, with a coffee break half way. During the break we settle all the world problems, and if someone would only listen the world would be a better place. However no one listens." ... **Ar-delle** and **Wally Pike** dodged some of our miserable March weather here with a cruise to Nassau, where Wally said it was 80°. ... From West Palm Beach **Jim Tobey** still suffers in the Florida sun, wind and showers, but finds time to malign me about the misuse of class funds. Ah, me! "I am glad to get your epistle of a week ago, but sorry to learn of death of Chet Runels who was a fraternity brother. I had not seen him since the reunion of some years ago when he told me about his heart condition. On March 3 I had the pleasure of a visit from Ben Neal. He had been to a plastics convention in Miami and then had visited friends in Boca Ra-

ton and Lake Worth, the latter next town south of here. He said he had gone to Port Everglades to meet the boat on which you and spouse were spending your ill-gotten gains, but the ship already had come and departed. We have had a most pleasant winter here with lots of social and cultural activities, but much suffering from the weather. It was 90F here a few days ago and has been about 85 for the last week. I even got Lena over to the beach yesterday, and have been regularly myself all week, between cocktail parties, lectures, concerts, movies, and whatnots, including bridge games. We will shove off a few days after April 1, as I am scheduled to lecture at Yale on the 14th and for four weeks thereafter. Hope you stop in Newtown this spring or summer. Meantime, have a nice trip to Alaska with the dues proceeds, or is Boston the equivalent of Siberia now?" . . . **Bud Walker:** "I am presently at West Palm Beach in my land yacht, in which I have spent most of the past two and one-half years traveling. I was eight weeks in Mexico, six weeks in Canadian Rockies and six weeks last summer in Nova Scotia. I carry a ham radio but have not yet knowingly contacted any M.I.T. graduates, but there must be some more radio amateurs among our retirees." . . . Good **Ray Walcott:** "My current thanks to you in appreciative recognition of the burden on you these late years; keeping us in touch with the growing list of 'in-for-repairs' cases is good work and not easy to do." . . . **Charlie Speed Williams** wrote about his coming operation: "I am sure it will be an easy one and that it will not affect my singing at the New York class dinner which I hope to attend." Good luck with your surgery, Speed, and we'll be looking for you, voice and all, at the New York dinner. . . . After a long, long silence **Johnnie O'Brien** comes to life with a very touching letter: "Checking with the hospital, I was glad to learn George had been discharged and I hope is better. Your letter and one from that hard worker for the class, Ben Neal, is the cause for this letter from me. I've had some tough times in and out of hospitals. If you and George recall the few times I have showed up at class dinners both in Boston and New York, much the worse for wear due to a bad heart condition, you would not have known the many times I could not even make the attempt to go, as much as I wanted to do so. I just want to thank you for your uninterrupted flow of good cheer which you and your letters brought me. Good luck to you and Ben Neal and what 'an ace' he is." . . . **Foss Purinton** writes from 320 Fourteenth Ave., South, Naples, Fla. 33940: "After looking around for several years we have finally bought an apartment here. This will be our winter address. Our home address is still Middlebury, Conn., and any mail sent to Connecticut is forwarded to us here in the winter. Yes, I have been retired for 13 years and have never been bored for a minute. My two coronaries stripped me of my several hobbies, but I don't miss them because I substituted the hobby of patience which I find very absorbing. I paint entirely inside now and have a fine set up in the new apartment here. There is a very active Art Associa-

tion here in Naples. Verta and **Jerry Coldwell** should be arriving here about now. Drop in on us sometime." . . . It's so good to hear from **Mary Plummer Rice**, writing from 191 Throckmorton St., Mill Valley, Calif. 94941. It's remarkable how busily and devotedly she applies herself to all her activities. "Retired? I've never worked so hard in all my long life, and unfortunately not with my three great grandchildren who are in France and Virginia. Penny has been in Fontainebleau with her Naval lieutenant husband and 15-months-old son, and in April they go to London for three years. A year from now I'll go there to see them on a Cook's tour to Russia and Yugoslavia and the International Women's University in Germany. In the meantime I still work three days each week in surgery in a local hospital and Sundays in San Francisco at the U.S.O. Club. I am state chairman of the D.A.R. for two years which keeps me hopping to give talks and begging help for the U.S.O. Clubs in Northern California. I am treasurer of the Mayflower Society of these four counties and I love the job since it deals with figures. I dread the day coming when I'll have to stay home and knit." Mary, you're wonderful—keep it up! . . . We all hope **Gardiner Wilson** has had a complete recovery. It's sad to hear of more and more of these troubles: "Just a note to let you know I am still on hand and reading your admirable class notes with much interest. Briefly, I can say I am thankful to be able to write a note on my doings as I had a close battle with a coronary occlusion last September which had made me really retire for the past few months since then. Things look o.k. now, but I must learn to live with this thing as I did with the first attack I had about 16 years ago. As I read your notes on Class '15, I suddenly realize how the effect of time is becoming so evident. Eastman Weaver a co-thesis writer of mine and Phil Alger (hi fellers!) are facing troubles that none of us foresaw as I sat watching them battle at chess during our get-together at the 50th Reunion, and then the Pirate and others you report on from time to time. Oh well, what do you want to do, live forever? I expect to go back to doing my consulting job in the plastic field as I was before this recent setback and to gain a brighter look than this report seems to develop. Also if you get down into the Pennsylvania Dutch country around here, I expect to be working as a tourist guide and will reserve top priority for you." . . . That irrepressible **Louie Young** comes up with a new solution of the mystery of the origin of that "Pirate" title for George. "As president of the 5W Club, 'We Won't Work Will We,' I am pleased to send this check from our treasury. After much research I have found out how George Rooney got the name of 'Pirate.' It stems from two words, 'Pie Rat.' I understand that for many years he has been sneaking around downstairs late at night to steal a little dividend from the pantry." . . . On the letterhead of "The Continental Apartments, Tuscon, Ariz.," **Louie Zepfler** says: "We are so far out of contact and so busy that we seldom see a classmate. **Alton Cook** did make a special trip here last fall. We had a good meeting—nuff sed. We are enjoying a

perfect desert winter and as a result have 100% occupancy for a good bit of it. Best regards." Now, I think you'll all agree that's a fine bunch of news from our widely scattered classmates—a great crowd. And I think you all know it's impossible for me to acknowledge every dues check and answer every letter you good fellows have so kindly sent in. But, I do want you all to know I heartily appreciate your generous response with your checks and letters to "help Azel." Ethel Rooney wants you all to know how much she appreciates your interest in cheering the Pirate through his hospitalization: "How can we ever express our thanks to the class supreme for the interest they all took in George's illness. Cards and letters from all over the world and phone calls made my days brighter. It surely made my Pirate feel great. All this, plus flowers and plants. Thank you all." Margaret Runels wrote a very gracious letter warmly expressing her feelings and appreciation to our class for our sympathy for her in the sad passing of Chet. Next month, the last column of notes for this season, will carry the play-by-play of our New York and Boston Class dinners.—**Azel W. Mack**, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

'16

Golden weddings, golden weddings, golden weddings—these are the items that are coming up more and more often as time marches on. As we all know, the **Emory Kemps** and the **Theron Curtises** had theirs some time ago. Others have too, but our statistical department hasn't kept us fully informed. What we do know, though, is this: the **George Mavericks** of Charlottesville, Va., are just about next in line for congratulations for they are going to break into this golden class in July. . . . And what else is coming up? Funny you should ask. Why of course, it's the 51st Reunion, and we have this opening message from our vital president **Ralph Fletcher:** "With the 51st Reunion weekend coming up in a couple of days, we find ourselves looking forward to the excitement and pleasure that we are sure to experience at this reunion. We also find ourselves looking backward to the past six months to see how well we have 'conditioned' ourselves for this weekend. Beginning in January we made our annual trip to Davos for some excellent skiing, and following that, as often as possible, we have enjoyed the New England ski slopes. With the advent of spring, fishing and skeet shooting became the major outdoor activities on weekends and whenever else we were able to slip away from the quarry. Midweek opportunities for skiing, fishing and shooting have been few and far between. Our plant is very busy, and I'm enjoying production as much today as 15 years ago. Happily, Sibyl and I and the children came through the skiing season without mishap, and we are all enjoying good health. We are looking forward to seeing our many returning classmates and their wives at the Reunion." . . . Looking back once more to the wonderful

50th last June, we are pleased to extract the following from the recently received Report of the President, 1966: "The month of June marked two anniversaries for the Institute. First, it was the occasion of our 100th Commencement by official count, although we must remember that M.I.T. throughout its early years of austerity indulged in no ceremonial exercises. It was also just 50 years ago that the final graduation took place in the old Rogers Building on Copley Square, and the move began across the Charles. The voyage of the barge *Bucentaur* to the Cambridge shore has gone down in history. For the benefit of those who came to Alumni Day on this past June 13, the Class of 1916 re-enacted scenes from that memorable celebration. It must indeed have been a gala occasion, with pomp and ceremony for three days such as the residents of our city have scarcely seen before or since, and which least of all they might have expected from staid and sober Boston Tech." How well we still remember the noisy doings in both 1916 and 1966!

As we write (April 10), we have travelers galore on the high seas, all composing, no doubt, dainty little vignettes of life that can safely be included in the class column for the sake of a sparkle here and there. A card from the **Steve Brophys**, mailed from Rarotonga, Cook Islands, shows the Bali Hai Hotel in the early morning at Maharepa, Moorea (which is best explained by saying "Tahiti"), and brings the message, "What a place Tahiti is!" Is Steve now going to suggest that we hold our 52nd in Tahiti, Pearl of South Sea, just a year from now? The **Elsa Muesers** would no doubt agree. When Steve wrote, he and Jessie were on their way to New Zealand, Australia, then Suva (Fiji), Pago Pago and Honolulu. Now, as the Brophys are coming, the **Irv McDaniels** are going. Already they have left Manila and are headed for Hong Kong probably, from what Kay has said on other trips, to get some new clothes made to order. Then to Singapore and then, judging from the gap in Irv's itinerary, probably some excursions and surprises that we hope will enliven our paragraphs for months to come. Before leaving Newport Beach in March Irv told of his gardens: "Our garden is a mass of bloom. We really have some exceptional blossoms this year, due to forced feeding—giant pansies, delphinium, freezias, spring bulbs, cymbidiums (orchids). It's a lot of fun." . . . Can you still swim three-quarters of a mile in the ocean, say at Miami Beach from the Algiers Hotel to the Roney-Plaza, "with no difficulty"? Well here's one who can, **Nat Warshaw**! And more, if you do this pretty regularly while on vacation, you can also do what Nat did in February—come home with five pounds less than you took. He says: "That is what plenty of swimming does for you regardless of age." Nat and Martha found both Evalyn and **Mark Aronson** "well recovered from their bouts of illness last spring," and "enjoying Florida life the year round very much."

Here's quite an item of interest in the December 1966 issue of *Illuminating Engineering*: "Engineering fellowship . . .

Establishment of the **Joseph Warren Barker** Fellowship in Engineering has been announced by J. William Hinkley, President of Research Corporation, New York City, a foundation for the advancement of science and technology. The fellowship, which will be awarded annually to a promising student for graduate study in engineering, honors Dr. Joseph W. Barker, a member of the board of directors of Research Corporation since 1934 who served as president and chairman from 1945 to 1959. Dr. Barker is a past-president of IES (1932-33). Because of Dr. Barker's close association with the Massachusetts Institute of Technology during the 50 years since he graduated with the class of 1916, the Research Corporation board of directors stipulated that the first three of these fellowships are to be awarded at M.I.T. Each award will provide a fellowship stipend of \$6000 plus a contribution of \$2000 to the school for its unrestricted use in connection with the fellowship. In establishing the fellowship, the board of directors of Research Corporation is paying tribute to Dr. Barker's leadership of the foundation over many vital and critical years, according to Mr. Hinkley." . . . We are glad to report an honor recently awarded to a fellow ASTM (American Society for Testing and Materials) member, **J. Spotts McDowell**. Spotts writes: "Nothing noteworthy has happened in my life since I last wrote, except a letter from W. S. Debenham, Chairman of Committee C-8 on Refractories of A.S.T.M. Mr. Debenham said in part: 'It is a pleasure to inform you that you have been elected an honorary member of Committee C-8, thus correcting a sad oversight of last year when we voted in Sosman, Sullivan, Schweder, and Phelps. Now you will have to be associated with such youngsters as Kraner, Kayser, Smith and Bradley.'" . . . **Charlie Cellarius** continues as a practicing architect in the firm of Cellarius & Hilmer in Cincinnati although, as he says, his partner, Herbert F. Hilmer a graduate of Cornell in architecture, is now carrying on most of the work. He says: "I had a trip last year to Scandinavia with my sister, and this winter I had a month in St. Thomas of the Virgin Islands with a short time in Florida. While I lost my wife some years ago, I have an attractive step-daughter who supervises my home in addition to her duties in Cincinnati as a secretary (not for my office)." . . . **Earl Mellen** of Millburn, N.J., says his retirement activities remain about the same including "bank, insurance, industry, civic boards and committees, very few related to engineering." Seems as though it is harder to unwind from some things, such as Earl's presidency of Daystrom-Weston Electrical Instruments, than from others. He says current priorities these days are: new on-line third generation computer for the bank, new building for Newark Museum, new civic center and revised master plan for Millburn-Short Hills, medicare program and other related problems for the Hospital Service Plan of New Jersey (of which Earl is chairman of the board).

The monthly Class of 1916 luncheons at the Chemists' Club in New York are held on the Tuesday following the first

Monday of each month (starting again next September 5th, as Jim Evans will remind you). The April luncheon included eight stalwarts, or whatever you call those people who order chef's salads or golden bucks: Art Caldwell, Joe Barker, Harold Dodge, Jim Evans, Rudi Gruber, Herb Mendelson, Francis Stern, and **Peb Stone**, who had just returned from the Caribbean, especially St. Vincent. If you are wondering where to go so that you'll come back looking extra healthy, ask him—he surely looked as though he had the answer. **Francis Stern**, another picture of health, told of the practically perfect weather in Palm Springs, Calif.; he had returned just days before the luncheon. **Jim Evans** passed around the card from Tahiti that Steve Brophy picked out for him, a Tahiti dancing girl no less with Steve's message "A place to retire to when young!" And Jim reported visiting **Del DeLaBarre** in the Walsh House (420 E. 59, N.Y.C.) and finding him greatly improved. Through Jim a set of tear sheets for the 1916 class notes for the past year or so have been sent to Del. **Rudi Gruber** told the story of his first visit to the U.S.A. from Germany in 1911, and his first experience of a kind. He was to attend a Harvard-Princeton football game and picked out a nice black and orange tie in London. He wore it to the game but to his cousin's horror and consternation for they sat on and cheered for the Harvard side! **Joe Barker, Art Caldwell and Harold Dodge** recalled that senior rambling course of D. C. Jackson's, the one in which D.C. never looked at a note or followed a text and yet instilled in young minds something really solid about the engineering problems of the real world, and Joe's answer, when no one else in the class could say whether to choose method A or method B for setting public utility rates: "It all depends on whether you're buying or selling!" And D.C., with his heartiest laugh, gave Joe a big A. **Herb Mendelson** told of going down to Florida this spring for some bone fishing, "semper paratus," (he's always using Latin—went to Yale first!) with three tackle boxes, four fishing rods, and all. But he says he caught just nothing, maybe one small catfish, after four weeks of diligent and dedicated effort on the Keys, while Vi found the sunning and swimming quite wonderful. . . . **Ed Hall** wrote in March from Marathon, Fla., where the Halls now spend winters, that this winter was wonderful on the Keys. Ed tells too of their trip in the fall of 1965—ship to Spain landing at Palma, Mallorca (**Don Webster** please note), plane to Valencia, then driving themselves to Granada, Malaga, and Seville. Says Ed: "Roads were very good, traffic light, and the Spanish truck drivers are better than our own in waving you past them. After several days in Madrid, we went by air to Zurich and then by train through Austria. Ended the trip with a visit to Venice, then to Genoa to take a boat home." . . . Back in March a card from **Peb and Dolly Stone** from Young Island, just off St. Vincent, gave us this: "Just a report of progress, last stop, and the best for this trip. Every day is picnic day. Very friendly and interesting guests and natives. One does anything or nothing

as the spirit moves. Met friends of the Bingers, Mr. and Mrs. Lewis Adams." . . . **Lewis Dow** tells of a busy two-day automobile trip of 650 miles from their home in Odessa, Fla., in March. Leaving at 5:00 A.M. they went with their daughter and son-in-law to Tallahassee to see their granddaughter who is attending Florida State. Lewis says: "This city is a beautiful place to visit at this time of year. Dogwood trees, azaleas and camelias are in full bloom." On the return trip the next day they stopped at Gainesville to visit their grandson who is taking a pharmaceutical course at the University of Florida. . . . We are glad to have word from **Everett Johnson** in Monroe, La., that he is getting along very well, really better than he had expected, since the loss of his wife last October. He says: "However, will have to say that only one who loses a mate after 44 years of exceedingly happy married life can realize just what a difference her death means." . . . **Bob Crosby**, one of our dependable respondents, declares he keeps busy at the usual things—odd jobs around the house and hobbies of photography and woodworking. He notes: "Come spring I hope to augment these with golf and fishing as usual." . . . We have thoughtful helpers all over, like **Dan Comiskey** for example who sent us his copy of Virginia and **Joel Connolly's** February *Southwest News*, a once-in-awhile breezy and entertaining sheet that our Tucson '16ers publish when the mood strikes. . . . **Dick Fellows** says he and Edith spent December through March in Indio, Calif., enjoying the warm sunshine and returned home to Kelseyville early in April. They are "still planning on a trip back East this summer and hope that we can make it in time for the June Reunion." . . . Says **John Gore**: "Nothing new here. Am still dreaming about the wonderful 50th Reunion. Can see it all in my mind's eye. It certainly was well planned all the way through, both in advance in getting literature out, etc., and in setting the schedule and carrying out the well-laid plans." They expect to be at the 51st for so far they have missed Chatham Bars Inn reunions. "Chatham is where we usually go on our trips to the Cape, so we will be right at home and might stay the week out nearby while we are at it."

We regret to report the death of **Joseph (Joe) Farhi** in Brooklyn on February 24, our friendly goodwill ambassador from Constantinople. We all remember Joe so well from our school days in Boston over 50 years ago, and how he helped to give us a better understanding about the better things abroad. Only recently he has kept in touch by telephone and through the yearly exchange of Christmas cards. He was with Con Edison in New York on design work until retirement about four years ago but continued active, for after his retirement he was invited by another company to continue work in his specialty with them. Though in these later years he was handicapped, he bravely took a taxi every day to and from his place of work. Our sympathies are expressed to Mrs. Farhi. . . . We also regret to report the death of **John F. Hogan** of Pawtucket on February 16, an architect who designed many churches, schools and public build-

ings throughout Rhode Island, Massachusetts and Connecticut. Upon returning from overseas service in World War I, he opened his architectural firm in Providence which he conducted until his retirement three years ago. A former U.S. government engineer in Pawtucket and a Public Works Administration architect, he later served as an OPA area rent director in Rhode Island, and from 1938 for more than 20 years was a member and chairman of the Pawtucket Zoning Board of Review. In 1936 Gov. Theodore Francis Green named Mr. Hogan to the first state board of examiners for architects. Later that year he was elected the board's chairman, a position he held for several years. . . . With the passing of Bill Barrett, **Joe Barker** has been asked to take over the job of Class Agent for the time being. As you have no doubt heard from Joe, he has set up a novel and painless scheme for getting 100 per cent participation in the Alumni Fund by all '16 graduates—a suggested \$19.16 contribution this year, so as not to overburden any who gave generously last year for the 50th. Joe urges action before June 30 so that it will count in the 1966-67 record. And now we stop with a hope to see you at the 51st at Chatham Bars Inn far out on the Cape. And keep the bits of information coming in by writing a little but writing often to—**Harold F. Dodge**, Secretary, 96 Briarcliff Road, Mountain Lakes, N.J. 07046

'17

Probably by the time these notes are in print the 50th Reunion will be history! One of the many reasons that this will be recorded in our Class History will be that it is the first concerted effort to enroll the widows of our classmates. Quoting from the Hospitality Committee's letter of March 16, "Even though your husband is no longer with us, we now consider you a member of the class of 1917 in his absence. We urge you to experience this membership by attending any or all of the events scheduled from June 9 to 12 of this year. Possibly you are well acquainted with some of our classmates and their wives and would prefer to accompany them. Let us know if we may make any arrangements for you. We also have in mind presenting to the Institute some form of tangible memorial in remembrance of the deceased members of our class. The form of this memorial has not yet been selected, but you may be assured that it will be in good taste and will be a suitable reminder to all of us of our friendship with those members of the class who could not be with us for our 50th Reunion." Our very able Assistant Secretary, liaison officer at the Institute, advises, "I talked with Mrs. Cochran who is in charge of developing and maintaining a list of widows for the Alumni Association. She has 134 of '17ers on the list, and as of March 29 49 of the March 16 letter had been returned by the post office as address unknown. It took special work to develop the list as no such record had been regularly kept." . . . Mrs. Lowell Cady, 712

Cumberland Ave., N.E. Atlanta, Ga., "I do not expect to be at the Reunion, thank you very much anyway." . . . Mrs. John S. Ellithorp, Jr., Langford Apt., Winter Park, Fla. 32789 (30th year report lists at Canajoharie, N.Y.), "How very nice to be included in the invitation to attend the Class of 1917 50th Reunion even though my husband is gone. I do appreciate your thoughtfulness and wish I could accept, but it would be impossible for me to be with you. Please thank the Hospitality Committee and accept my most sincere best wishes for a most successful Reunion." . . . Mrs. William Chambers (Pots) Meharry, College Inn Apts., 1146 Edgar Ave., Chambersburg, Pa. 17201, advises she is coming. We will greatly enjoy seeing you, Lydia. . . . Mrs. Francis H. Rockett, 132 Harvard Ave., Rockville Center, N.Y. writes, "This note should go to 1917 Hospitality Committee in response to their very gracious invitation to attend the 50th Reunion festivities. However, as it is not possible for me to go, and I wish to make a contribution to the Memorial, I write to you, Loosh, instead. My check in the memory of my husband is enclosed. With best wishes for a most enjoyable weekend of reunioning." Trust that Katherine L. Rockett will receive the Technology Review in view of this contribution. According to the 30th Anniversary report on Francis Haynes Rockett, Course VI, "From 1917 to 1927 I was with the Bell Telephone Company of Pennsylvania as district plant engineer in Philadelphia. Then I was transferred to the New York Telephone Company serving in personnel work for two years, after which I returned to engineering work on the staff of the chief engineer of the Long Island division. My recreations have been photography, sailing and mountain climbing in Maine, the White Mts., and the Adirondacks."

The procedure in regard to the Technology Review going to widows is that as soon as the Association receives word of the death of an Alumnus, his name is taken from the active file and no more Reviews are sent unless the widow requests, and then for the duration of his subscription or Fund year. It would then be dropped unless the Association puts her name on the list especially, or she makes a contribution to the Alumni Fund. Review subscription rates are \$4.00 per year U.S.A. and \$4.50 in Canada. . . . Mrs. Allison R. Williams (Henriette) PO Box 934 Vicksburg, Miss. 39180, writes as of March 22, "Thank you for the enclosure of M.I.T. Alumni Fund envelope. I am sending the contribution and hope they will keep this address on their list. . . . **Howard Melvin**, our Vice-president on the West Coast, writes as of March 8, "I have just mailed the enclosed letter to 26 members of the class on the West Coast. Also in case you may wish them for reference, there are enclosed copies of the letters and my résumé mailed last March '66. In addition I am returning the extra set of address cards with a few address corrections. Of the six who replied in 1966, two or three indicated that they might be present at the Reunion. Mrs. Melvin and I have sent in our reservation request and will arrive on the 8, leaving

the afternoon of the 12. I am planning to pick up a new car in Detroit, go from Boston to our old fishing camp in Maine, then to New York for a few days before returning to California." In addition he encloses a 50-Year Résumé, "I was a one-year graduate student, Course VI, following graduation at Washington State University in 1911, one year as General Electric test man and four years an instructor in electrical engineering at Washington State. In July 1917 I was given a job in the electric bond and share system with Utah Power and Light Company, Salt Lake City. After three years I transferred to the Washington Water Power Company, Spokane, for a five-year period as an electrical engineer. Then in 1925 there was a move to the New York office with Ebasco Services, Inc. During the years that followed several positions were held, electrical engineer, sponsor or coordinating engineer for the present Middle South Utility System, and then the Pacific Northwest Companies in Montana, Washington and Oregon—chief sponsor engineer and finally chief consulting engineer for 17 years until retirement in 1958. Principle interest and work have included all those associated with the electrical utility industries, engineering operations, applied research, particularly high voltage transmission, system planning, inter-connections and power cooling operations. As chief consulting engineer, civic, mechanical, gas and nuclear engineering were covered. Power systems for which services were performed were located in over 30 states in the U.S. and also in South America, Japan, Australia and Greece. In addition active part was taken in the World Power Conference and the International Conference on Large Electric Systems. Following retirement in 1958 Mrs. Melvin and I returned to the West to live in Los Altos Hills, Calif. We have had an extremely rewarding and interesting 53 years, expanded greatly by the year at M.I.T. Now time is completely and enjoyably filled with golf, fishing, trips, stereo photography, family nearby, and friends from near and far."

Thanks again to Class of '16 advising that **Vincent Panetti** and his wife were among those present at a Ladies Night with the Alumni Club of Southwest Florida in December at Sarasota. . . . **Stan Chisholm**, 2503 Commonwealth Ave., San Diego 92104, sends a clipping on **Robert Mulliken** and writes, "The enclosed on our classmate is possibly more detailed than the news releases you may have seen. We were both in Course V and commuted into the North Station and walked over Beacon Hill to the old Tech on Boylston Street. We were together in the Chemical Warfare Service also, he on mustard gas and I on gas defense. He wound up hospitalized for some months because of spilled mustard gas. The last time I saw him, about 1932, he was lecturing at Harvard and I could not follow his discussion. I have written to him recently to congratulate him on one of his several gold medals, and he replied that he did not remember what we used to discuss. I remember quite well, and it was solely scientific speculations which was the only thing he was apparently interested in. As

I recall it you also, or was it another Proctor [it was another], played in the Tech Show orchestra. I must say I gave up years ago on the fiddle, though in 1919-20 I played in the Melrose Symphony. But later in my many shifts, I never fell in with musical people and other interests took over." . . . **Pete Newell** writing to **Ossie Holt** as of March 21, "I think I can make some definite plans now on the Reunion and will be glad to room with you again. This is what has been holding me up: my daughter and 4½-year-old grandson from Florence, Italy, have been spending the winter with us. My daughter is now returning in May or early June and we are going over later, probably in September, after spending the summer in Maine. So now my wife will have to be baby-sitter, and I will come alone, although I would have liked to have had her come too. I doubt if I can take in Alumni Day and will probably leave the Cape sometime Sunday for Maine." Sure hope a good time was had by all. . . . **Dad Wenzell** retired from the International Bank for Reconstruction & Development on January 1. He will continue to live in Washington. . . . **Ed Waechter** cannot make the 50th but has ordered his blazer anyway. Ed is living in Hollywood, Fla., and his doctor says "no" to the trip. . . . **Ray Ramsey** will not attend the Reunion as he and his wife have a Northwest Canadian Rockies and Alaska Inland Passage-way trip which was planned in 1965 and has been postponed to this summer. Ray also has ordered his blazer, and we hope he will wear it on the Inland Passage. . . . **Frank Butterworth**, when registering for the 50th, mentioned he had been having sessions with the Davis Clinic in his hometown, Marion, Ind., and also Mayo Clinic. He expects surgery in April and recuperation so he and his wife will be at the 50th.

William A. Sullivan, Sully the retired Admiral, writes as of Washington's birthday from Las Vegas, "We came out to the Southwest early to get away from the New Jersey snow and rain. Here we have not seen a drop of precipitation since we left home. We had planned as usual to spend the winter at Death Valley, but this place is becoming too popular. Our request for our wood cabin was too late. We could have had it for the season, but not for the week-ends. It meant moving out every Friday and coming back every Monday. Inasmuch as any real food market was over 100 miles away, this was impossible. So we settled here in an apartment next door to one casino and within ten minutes walk of a half dozen others, very satisfactory. [Did you beat the IBM system?] Climate here is very satisfactory at this time of the year, although daytime temperature, 55-65 degrees, is cooler than at Death Valley, and humidity, 25-35%, much higher. But we can get out in the sunshine every day. We quite definitely decided last year that a new town being built within the city limits at San Diego was the very best all year around climate. We bought a site last year, intending to build this year, but I have had complications getting away from New York and too many old associates who want me to continue doing some work. We hope to

move to California this spring. I must be in New York April 1, so I will try to drop in on one of the luncheons soon." Sorry you did not make the April luncheon. . . .

Our president, **Al Lunn**, has asked for some space to recognize those who made outstanding contributions to the success of our 50th Reunion. His notes follow: "First of all I want to thank each of you who attended the reunion for your part in making it a most memorable occasion; to all the contributors to our wonderful 50-Year Gift a special accolade; to Ray Stevens, our superb money raiser, and his committee our tremendous gratitude; to our honorary members, Conchita Lobdell, Jim Killian, Howard Johnson, Don Severance and Lt. Col. Edwin 'Buzz' Aldrin, Jr., our thanks for their participation; special appreciation to Stan Dunning for notices and publication; to Tubby Strout for outstanding hotel and program arrangements; to Brick Dunham for a fine historical booklet; to Loosh Hill for the multitude of details well-performed in the financial area; to Dix Proctor for his secretarial work and efficient help with the blazer program; to Ken and Bud Bell and Bob Erb for fine indoor entertainment; to Ray Blanchard and Dick Loengard for sponsoring our outdoor entertainment; to our class widows for their excellent support and contributions to our gift; to our hospitality committee for their welcoming activities; to Penn Brooks for his thoughtful address to the graduating class; to Les Groves for his helpful participation in our program; to Ray Brooks for many years of service as our Class Agent; to Fred Lehmann for his fine liaison with the Institute for our benefit; to Stan Lane for his work as official photographer; and last but not least to our blazer underwriters for going on the line for us. To all, my personal gratitude and sincere thanks."

Address changes include: **Harold C. Alley**, 203 North Catalina, Los Angeles, Calif., 9004; **Homer C. Ling**, Lintronic Labs., 54-58 Bartholomew Close, London, E.C. 1, England. . . . **Bob Erb** writes as of April 2, "We enjoyed Mexico very much. Unfortunately something came up that required me to be in New York on March 10, so we had to fly back on the 9th, the opening day of the M.I.T. Fiesta. However, we had a very pleasant evening with Conchita the night before and spent the morning of the 9th with the Fiesta group. We hope to go back another year. . . . The next to the last New York luncheon until fall was attended April 6 by **Ed Aldrin, Sr.**, **Bob Erb**, **Dick Loengard**, **Bill Neuberg**, and your Secretary.—**C. Dix Proctor**, Secretary, PO Box 336, Lincoln Park, N.J. 07035; **Stanley C. Dunning**, Assistant Secretary, 1572 Massachusetts Ave., Cambridge, Mass. 02138

'18

The warm days are back again, with spiritual intimations worthy of apple-cheeked children who will soon be out of school. We've been out of school nearly half a century, which is more than long

enough to stretch the lessons of experience on a membrane of sentiment and dignity. **Warren Dow** says, "My life currently offers little of burden or of triumph. The days pass pleasantly here in Pigeon Cove, Mass. During recent weeks (March) snow shovelling has been my main pastime. Hopefully lawn mowing and gardening will soon occupy my straining and maneuvering. Regardless of the season I am still trying to paint a watercolor that satisfies me. Meanwhile I enjoy the effort without being too desperately ashamed of the result. I do not mourn the so-called good old days when neither blizzard nor tempest was an excuse for not being behind the wheel of an automobile pounding down an excellent but uninteresting turnpike to the office or to see a customer. Nor am I ever bored in my retirement. Occasionally someone out of our past rings the door bell and a pleasant visit results. Indeed, this is a glowing invitation to any '18er who cares to push the particular button which will ring said bell." . . . **Malcolm Baber**, may his tribe increase along with Abou Ben Adhem's, is conscious of the spring because he's, "Just come up for air after the worst of the income tax rush. Faint signs of financial resprouting will soon appear in the bank balances, and it will again be time to plant some in the M.I.T. fund. I wish I also had stirring news for you to cultivate in the class notes, but all is mostly repetitive routine. We did have English friends from Winchester visiting us. We think they left St. Swithin behind (his tomb being in the cathedral at Winchester). Anyway, when it doesn't rain, it snows. Spring is not here. It must be meandering somewhere below Mason and Dixon. We heard President Johnson (Howard, not Lyndon) speak at the Philadelphia M.I.T. Club early this month. He made a splendid impression." . . . One of my cousins who enjoys perpetual spring spent the winter in Florida. At my request she telephoned our greetings to **Al Sawyer** who is gracefully growing old at Ormond Beach. He says, "Come on down!" . . . **Sam Barron** has a comfortable home at 712 Eastwind Drive, North Palm Beach. He had a difficult winter. Letters from some of you chemical engineers would get his mind on greener valleys and more tumbling streams. There must be upland meadows to share with him in the minds of some of you classmates. . . . Occasionally we see **Ben Ballantine** at the Rindge Supper Club or in our Jaffrey supermarket. . . . We met **Harold Weber** and his wife at the spring concert of the New Hampshire Philharmonic. He must be incredibly busy because he never seems to have a free day for us to drive the 25 miles to Mason for a long promised exhuming of happy memories. We both had a laugh when a guest he was with (so he says) asked, "Who was that old man you were just talking to?" . . . **Marvin Pierce**, eloquent in the lessons of experience, writes from the International Executive Service Corps office on Madison Ave., "No one in real life could have an address like yours which reads Thorndike Pond, Jaffrey 03452. As an old (and I mean old) publisher I would insist on leaving that zip code off because it takes you right out of the realm of Tho-

reau and into the realm of L.B.J. The last time I saw any number of M.I.T. men together was nine years ago at our 40th reunion. At that time I had retired from *McCalls* and was working as a consultant on *Time* magazine. I thought I was to stay there a year, but found myself working three. Long before that spell was up, I had run out of suggestions, and finally out of plain self-respect, resigned. From there I went to work for the New York World's Fair in a more or less consulting capacity, stayed for two and one half years, and got fired. This was my second retirement. On the day my pay stopped, Mike Cowles, the President of the company which publishes *Look*, asked me to come to work for him. I stayed there two and one half years which brought me to the end of 1965. After a month at home, presumably enjoying my third retirement, I came to work for the International Executive Service Corps. (Retirement is for the birds. I get into my wife's hair and she gets into mine.) I find this organization quite exciting and very worthwhile. It supplies American know-how in developing countries, largely through retired American professionals. We have received over 550 requests. Both the volunteers and the companies are really benefited. We pick men who are not only skilled technically but who present the image of the helpful American, as opposed to the ugly American. Enough of these men working around the world can do more to establish us favorably than many of the millions of dollars which are spent abroad for such things as the Marshall Plan. About the only M.I.T. men I see are **Bill Wyer** and **Phil Dinkins** whom I run into occasionally at the University Club. They both seem to stay in good health. I have just come back from a week of bass fishing in northern Florida with my oldest daughter and my oldest son, which brings me to other genealogical data. My four children are married and have produced twenty-one grandchildren. The oldest granddaughter has graduated from Smith and been married for two years. The oldest grandson is in Yale and the next oldest is in Harvard. I always feel a little hesitant in presenting my name to an M.I.T. publication. I haven't been an engineer since 1921 and I wasn't much of one then. I find that I graduated as an engineer in the presence of publishers and here I am a publisher in the presence of engineers."

Stretching over from last month there remains part of **John Poteat's** sentimental and dignified journey to Europe in the interest of stretching his experience. He visited Trondheim, Norway, of World War II memory. "We boarded one of the coastwise steamers which are almost a commuter service between the small fishing villages. Many of them are inaccessible from the land. On the hillsides are drying racks hung with fish and large frames for drying the nets. The North Cape rises several hundred feet straight up out of the sea. We saw the midnight sun, visited a Lapp village with its tents and reindeer herd, discovered a city of 18,000 where herring are processed into oil for cosmetics, soap, and margarine. Many of the inhabited areas along the coast still show evidence of having been

bombed during the war. There are little farms on the hillsides (some only accessible from the sea), farm animals in the pastures, and in the fjords more beauty than any man can describe. Can you visualize solid granite walls rising 3,300 feet with waterfalls cascading in a delicate burst of glory? The views from the zig-zag roads over the mountains separating the fjords are fabulous. The roads themselves are marvels of engineering. We even climbed up to the Briksdal Glacier. On the way to Oslo we saw farm buildings made of logs with six inch sod roofs from which grass was growing. From there we flew to Helsinki and on July 18 to Leningrad where we experienced the frustrations and limitations inflicted on tourists. We could only go where our guide took us. The Hermitage museum is fabulous, but the maintenance gap is evident in the drab appearance of most of the city. Few people smile. We got to Moscow on the *Red Arrow*, a train seized from the Germans. Moscow was more of a thrill than Leningrad because it is the center of Russian activity. Kremlin is the Russian word for fortress. Since Stalin's death parts of it have been open to the public. The only three post revolution sights we were allowed to see were all in Moscow: the magnificent Congress Hall seating 6,000, where we saw both opera and ballet; the Exhibit of Economic Progress; and the University of Moscow. The real high spot was the attractive, knowledgeable young woman who was our guide. Her picture was on the cover of a Saturday Evening Post in July 1965. However, unless you have the patience of Job, the determination of a bull dog, and the bouncing comeback of a kangaroo, stay away from Russia. We left our sense of being watched, thwarted, and foiled when the wheels of our plane lifted from the Moscow runway enroute to Stockholm and an eight day voyage home." . . . Spring, with all its refreshing breath, will never again be awaited by **Dave Rubin**. Nor will experience offer him any more lessons to learn. He died on February 28 at his winter home in Miami Beach. At M.I.T. he thought he was a civil engineer. During World War I he was a lieutenant in the army. After that he worked for Stone and Webster until 1926. From then until 1952 he taught math at Mechanic's Art High School in Boston. In 1952 he resigned to start a girl's camp in Maine which occupied his time thereafter. Dave is survived by his wife, a son, a daughter, and three sisters.—**F. Alexander Magoun**, Secretary, Jaffrey, N.H. 03452

'20

Once in a while we get a faint glimmer of evidence that one or two of you read these notes. Such was the case when my request for information about **Albert B. Greene** brought a welcomed response from **Ernie Whitehead**, the squire of Worcester. Ernie said that he had received a letter from Francina telling of A.B.'s death. The Greenes lived at 185 Macon Ave., Asheville, N.C., where they had moved after they left Washington, D.C. Ernie says their daughter is living in Cambridge.

They also have a son. A note from Francina, just received, says, "I always wished Albert had returned to M.I.T. and some of his class reunions for I would have enjoyed knowing more of his classmates and their wives." We share those sentiments, Francina. . . . Even before the news of **Flossie Fogler Buckland's** tragic death appeared in last month's class news, I have been receiving confirmations of the extent of this heavy loss to the class. **Norrie Abbott** writes, "What a shock to hear about Flossie. How loyal she was and how faithful in her reunion attendance." **Cac Clarke**, Secretary for the Class of '21, writes, "Flossie once worked with me on the Tech, and I have always had the greatest respect for her outstanding ability in anything she wanted to do. We all share a very great loss." The Buckland home in Schenectady was so badly damaged by the fire that Bruce has not been able to stay there and has been living at the Hotel Van Curler. Anyone caring to write him can address his office, General Electric Company, Gas Turbine Department, Building 53-315, 1 River Road, Schenectady.

Let me predict once more that our attendance on Alumni Day this month approximates 20 members of the class plus at least half that many of their wives. Hopefully those present will obtain some advance information from Reunion Chairman, **Ed Ryer**, or members of his committee, on how plans are progressing for the big event three years hence. Unfortunately, **Prexy Abbott** and his gracious **Betty** will not be on hand because of their long planned and awaited safari to Europe. Bring back some color slides to display at Reunion, **Norrie**. **Bob Patterson**, who has been busy organizing man and money power for our 50 year class gift to M.I.T., was recently elected to the board of directors of the Curtis Publishing Company which is currently making a spectacular comeback in the magazine publishing field. **Bob** is already a director of several Massachusetts corporations. . . . Glad to see that **Billie** and **Dick Gee** have not forsaken their lovely home in South Dartmouth, Mass. Their previously mentioned Florida address was only for the winter months, and they are now back on Bay View Ave. and presumably have the sails unfurled. As long as we can boast couples like the Gees, the Burroughs, the Abbotts, the Ryers, and the Reeds, to name only a few, no one can say that our class has lost its vim, vigor, and vitality. . . . **Charlie Klingler's** address is 4310 East Keim Drive, Paradise Valley, Ariz. Sounds entrancing. . . . Word has just come in of the death of **Alton E. Libby** of Vinalhaven, Maine, on January 28, 1963—**Harold Bugbee**, Secretary, 21 Everell Road, Winchester, Mass. 01890

'21

Viva! Olé! We're back from a delightful interim reunion of the Class of '21 in conjunction with the 19th annual Fiesta of the M.I.T. Club of Mexico City. On behalf of all of our happy couples, we want to extend sincerest thanks to the officers and members of the Club and to their

lovely ladies for being such gracious hosts. The officially programmed events were ideally chosen for the enjoyment of the more than 100 alumni of various classes in attendance from outside Mexico and the free time was well utilized for a special dinner for all '21ers and for numerous gatherings of smaller groups of our classmates. Acknowledgments go to **Vina** and **Ray Cooper**, **Ruth** and **Irv Jakobson** and **Muriel** and **George Owens** for having originally concocted the idea last June for our Class to have another reunion in Mexico—this time to observe the 50th anniversary of its formation. Unfortunately, at the last minute the Coopers were prevented from making the trip. **Class Prexy Ray St. Laurent**, ably assisted by **Helen**, deserves the entire credit for carrying out the multitude of chores in organizing and arranging the reunion, as well as in communicating with the 20 couples and guests from the class who were present and aiding them in making their individual arrangements. Assistant Secretary **Ted Steffian** and others also materially contributed to the notable success of this third interim reunion which we have held outside of the United States. It was not a "packaged" trip. Some of our classmates arrived in Mexico in advance of the Fiesta to do their sightseeing; most of us toured the country afterwards. But the high spot was the three-day period crammed with the special events of the Fiesta. Since some couples have not yet returned to the States as these notes are in preparation, it is not possible to record everyone's story at this time, but we hope all those in attendance will write us about their travels. We must, therefore, limit this record to the observations made by **Maxine** and your Secretary and supplement them as we receive other data from you.

Our story begins with a weekend of rain, snow and high winds which wreaked havoc in New Jersey and most of the East Coast. Our local "commuter" airport was affected, roads were inundated and undermined and small cars were banned from the Verrazano-Narrows Bridge, but we managed to reach the hotel at Kennedy Airport where we spent the night to be certain to catch an early plane the next day. Bon voyage phone calls from family and friends were followed by a call from **Emma** and **Al Lloyd** who had just arrived at the hotel and had traced us there. Dinner together was the prelude to all four of us anxiously watching airport activity from our veranda window to get some clue from the steady stream of stacked-up arrivals and the sporadic departures as to whether we would be able to fly in the morning. We did, on a beautiful, crisp, blustery day—but under threat of more snow! On board for the 2000-odd mile non-stop trip were the **Lloyds**, **Ruth** and **Irv Jakobson**, the **Eben B. Haskells**, '26, and **Maxine** and your Secretary. The four-hour flight was considerably shortened by visits enroute. On our arrival in the welcome warm atmosphere of Central Airport, Mexico D.F., the presence of a handsome *caballero* proudly displaying a cardinal and gray banner inscribed "Tech is Hell," meant nothing to the uninitiated but caused a stampede to his side by fellow beavers. It was jovial

Clarence M. Cornish, '24, "Mr. M.I.T. of Mexico," who, with his friendly and efficient corps of greeters, promptly dispatched us all to our respective hotels. We had the good fortune to be driven to the Hotel Alameda by **Horace G. Whitteley**, University of Michigan, an associate of **Charlie Davis**, '49. The extremely pleasant, sunny and dry weather which marked our arrival was to continue throughout the next several weeks. We found cautions about the supposed difficulty in breathing at the 7500-foot altitude of Mexico City to be grossly exaggerated and were not aware of any differences in this regard from our conditions at home even at the 10,500-foot altitude crossing the Sierra Madre Mountains on our later trip to Cuernavaca by car, other than the desirability of moving deliberately and going slowly on stairways to avoid early fatigue. Speaking of altitudes, we reveled in the superlative view by day (sometimes including snow-capped Popocatepetl and Ixtaccihuatl in their 17,000-foot glory) and the myriad of twinkling lights to be seen at night from the three observation levels atop the 42-story Latin-American Tower whose 8000 feet above sea level is claimed to be the highest man-made elevation in the world. The Mexican equivalent of our Chamber of Commerce has missed several big features to brag about. There's the fact that the humidity is so low that one does not perspire excessively, even out in the hot sun in the Oaxaca area, only 17° above the equator. Then there is that transcendent institution, the siesta, in which we indulged at every opportunity. Furthermore, despite the pointless North American practice of regarding appointment times, Review deadlines, etc., as rigid, we are reveling in having imported the "Mexican Minute," the incomparable procedure of relegating clocks and calendars to positions of decidedly secondary importance. To all requests, whatsoever they may be, our answer is now "mañana!"

We had marked this day before the start of the Fiesta as one of rest and acclimation, but it was to be otherwise. Greeted at the hotel by a welcome note from **Marge** and **Jack Kendall** and a phone call from **Helen** and **Ray St. Laurent**, we found the resident contingent of **Anne** and **Wally Adams**, **Muriel** and **Eric Smith** and the **Lloyds** rarin' to go to the famous Ballet Folklorico de México that evening. We were fortunate to get seats together in the first row of the balcony on such short notice and nearby were the **Kendalls**. The 17-ton Tiffany glass curtain is impressive and worthy of a trip to the Palace of Fine Arts. The superlative show is a rare treat and we have since continued to enjoy its colorful memories by means of a recording we purchased. Next morning most groups of '21ers breakfasted together at their respective hotels, and then we all went to the official registration and reception at the Fiesta headquarters in the well-established University Club on the Reforma. This was the first meeting of our entire delegation, which included the following: **Anne** and **Wally Adams** of Middletown, Ohio; **Billie** and **Tom Bartram**, St. Albans, W. Va.; **Helen** and **Mich Bawden**, Duxbury, Mass.; **Maxine** and **Cac Clarke**,

Brielle, N.J.; Alex and Munnie Hawes, Sea Girt, N.J.; Betty and Dug Jackson, Havre de Grace, Md.; Ruth and Irv Jakobson, Glen Cove, N.Y.; Anne and Mel Jenney, Melrose, Mass.; Dottie and Wayne Keith, New Orleans, La., guests of the Bawdens; Marge and Jack Kendall, South Pasadena, Calif.; Emma and Al Lloyd, Westerly, R.I.; Helen and Bob Miller, McLean, Va.; Kim and Don Morse, Wellesley, Mass.; Kay and Phil Nelles, Stoneham, Mass.; Muriel and George Owens, Vero Beach, Fla.; Helen and Ray St. Laurent, Manchester, Conn.; Lovina and Ted Steffian, Cambridge, Mass.; Muriel and Eric Smith, Montreal, Que.; Maria Helena and Vivi Valdés, Mexico D.F.; Ruth and Charlie Williams Guilford, Conn. Mary and Robert W. Barker of Philadelphia, Pa., (Bob fought the Battle of the Charles with us and is now listed with '24) also joined the '21 group. Maria Luisa and Val Vallarta of Mexico D.F., returned from a trip abroad just too late to attend the Fiesta events, but we were privileged to spend an afternoon with them later at their delightful home in company with the Jacobsons and the Jenneys.

Several trips were provided that morning for the alumni visiting the Fiesta and we joined the city tour, under the able direction of Conchita Lobdell, Vice-president of the M.I.T. Club of Mexico City, and the wife of another member of the Club. We were treated to excellent accounts of the interesting spots we visited, all closely related to the history of old Mexico and few of which were on the usual tourist routes. We also had the opportunity of seeing the huge Merced Market district in full operation. When we came back to the University Club, cocktails and a social hour preceded a delicious luncheon—"dinner" would better describe it. These occasions provided for meeting and thanking our congenial hosts of the Mexico City Club for their many courtesies and their kindness to us all. Ian A. Clark, '61, toastmaster of the large luncheon party, had each alumnus identify himself and then introduced the various officers and committee chairmen who had arranged this eventful Fiesta. Our Class President, Ray St. Laurent, presented to the M.I.T. Club of Mexico City a scroll of appreciation from the Class of '21, handsomely engrossed by Assistant Secretary Ted Steffian and signed by all '21ers in attendance. Club President, Jim Rattray, '48, presented each of the '21ers with a beautiful silver Aztec-calendar ash tray, inscribed "M.I.T. Fiesta '67." Of course, all the men received M.I.T. steins, with the legend "XIX Fiesta," and promptly christened them with excellent cerveza. Each of the ladies received a silver demitasse spoon. As a gift from the Class of '21, Ray presented to Clarence M. Cornish, '24, former president of the Club, and to his lovely wife Luisa a gorgeous silver tray appropriately engraved with the M.I.T. seal and a message of appreciation for his years of loyal service to the Club and to Technology. Nish responded with interesting observations, among them that Ted Steffian was born in Mexico City; that Ted was the first manager and Irv Jakobson the organizer

and stroke of the first varsity eight-oared crew at M.I.T.; and that Ray had established the *Tech Engineering News*. Dr. Jerome B. Wiesner, Provost of the Institute, brought official greetings from Cambridge and commented that Technology had advanced on so many fronts that it could now best be defined as "an expression of the character of the United States." That evening Dr. Wiesner delivered a memorable and well-received address on the subject of "The Scientist's Role in the Search for Peace" to a crowded auditorium at the Mexican-North American Institute of Cultural Relations. It was followed by a reception and a party for the M.I.T. visitors.

Next day everyone went on a trip to Chiconcuac, a typical small town in the suburbs of Mexico City. We visited a native home and then were escorted through a compact factory that made yarn from raw wool and produced all manner of native clothing—which proved of especial interest to the ladies. The next stop was in Texcoco for luncheon on the picturesque gallery inside the *Cortijo de la Morena*, surrounding a bull ring. While we ate well-prepared Mexican food, various members of the party, including Bob Barker, volunteered as matadors. A flourish of trumpets, a grand march, and the stout-hearted alumni showed off their newly-acquired prowess with the cape against small bulls. The antics of the amazed animals reacting to the shaking knees of the bold cape swingers provided screams of merriment never encountered at the real thing. No injuries were reported by either side in the several contests. Prizes of colorful *banderillas* were awarded following an afternoon of entertainment in the lounge, recognizing excellence both in the ring and with the *porrones*. Back in Mexico City that evening the entire '21 contingent had a unique dinner under the stars within the lantern-lit patio of the lovely old Hotel de Cortes, to the serenading of a group of guitar players. There was no set program, but everyone got ample opportunity for visiting with others. . . . Early next morning the visitors journeyed to Tepotzotlán, a colonial town noted for 17th century baroque architecture and the magnificent San Martin Seminary, now a museum. Wives of members of the Club capably served as tour guides enroute and at the seminary. On the modern highway going back to the city we paused at the profusely-flowered formal garden entrance to the extensive modern plant of *Compania Ron Bacardi S.A. de Mexico*, where Luis J. Bacardi, '17, who heads the firm, had provided a long bar in a shaded patio. Delicious rum drinks of every description offered a welcome and most refreshing break in the journey—thanks to the courtesy of Senor Bacardi. On our return Nish hosted a group at the fine family restaurant, *Meson del Caballo Bayo*, where we consumed great quantities of local delicacies with adequate supplies of *tequila*, *sangrita* and *cerveza*. This was the more enjoyable experience because it was completely off the tourist circuit and it offered a homey picture of Mexican families relishing a good meal. . . . Then the Fiesta program was concluded with a truly grand

finale—the *Noche Mexicana* that evening in the spacious gardens surrounding the home of Don Federico Tamm, which was originally a 16th century Spanish colonial convent. All of the local people were resplendent in bright costumes representing the distinctive dress of almost all of the areas of the Republic of Mexico. A native dance band and professional singers and dancers vied with the members of the Club and some of their accomplished youngsters for honors in songs and dances under the brilliantly lighted and decorated trees and shrubbery. In the cool of the evening spiced hot rum started the festivities, which continued through a delicious buffet menu of native dishes prepared and served in the gardens. Needless to say, the bar was a popular spot for all sorts of native and more familiar beverages. The high spot of the evening was the attempt by numerous guests to demolish the *piñata*, a monstrous paper Technology beaver, dressed as a matador and hung from a rope so it could be pulled up out of reach if the blindfolded assailant swung his club too near. Destruction was finally accomplished to the delight of the crowd which scrambled for the nuts, fruits and toys which tumbled out of the figure. Dancing and entertainment continued far into the night and morning. . . . We all regretfully said *adios* to our splendid hosts and sincerely expressed the hope that we might be back to help celebrate the 20th annual Fiesta on March 14, 15 and 16 in 1968.

It was at this point that our '21 couples separated to take the various tours they had planned. Maxine and your Secretary found ourselves constantly playing tag with the Adams, Lloyd and Smith couples on our various trips. We traveled by car to see the numerous churches of Cholula, the crossroads of early Mexico, and the excavations beneath an ancient pyramid; the breathtaking view of Popo and Ixta from the heights of Puebla, a town of varied industries; plus stops in many smaller towns along the route. Other days brought visits to the luxurious gardens of Cuernavaca with their unbelievable displays of familiar and unfamiliar flowers, trees and shrubs in bloom. High on a hill the silver center of Taxco has untold points of interest and now boasts one of the most unusual night clubs in Mexico, the "Singing Frogs," operating inside and around a series of buildings on a steep hill, which date back to the 1530's and once were used in our times by the North American, William Spratling, as a factory when he revived the silver industry in Taxco. It was an hour's plane ride for us to go south from Mexico D.F. to Oaxaca, whence, on successive days, we saw the Tule Tree, local markets, primitive pottery making and weaving and the amazing Zapotec and Mixtec structures at Mitla and Monte Albán. We were joined on the trip down and back by Anne and Wally Adams. The town of Oaxaca nestles up on one of several hills in a long, fertile valley that winds its way down to the Pacific Ocean. A thriving metropolis by day, it becomes a fairyland of lights at night; at dawn a big red ball pops up rapidly out of the roseate sky, ascending above the silhouetted sugar-loaf peaks which seem to

surround the town. As good Boy Scouts, Wally and your scribe observed that the crescent moon was practically horizontal and the North Star in an unaccustomed position down low on the horizon. On our return to Mexico City our own grand finale was a visit with Anne and Wally to the Museum of Modern Art, followed by a splendid dinner on the roof of the Hotel Tecali overlooking the city and the nearby Chapultepec Castle and the park. If others of our group will write your Secretary of their own travel experiences, we'll try to chronicle them in later issues. Also, if you wish to exchange with others the pictures you made in Mexico, we will endeavor to act as the central point and will gladly make available our own several hundred color slides for your use in making copies. . . . This is our news. Now tell us yours, by letter, by recording it on tape or, even better, by joining the '21 gang on Alumni Day on campus in Cambridge on June 12!—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N. J. 08730; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, Inc., 19 Temple Place, Boston, Mass. 02111

'22

Again with one foot on the step of Pan-Am's flight to Rome and Beirut, your Secretary gives the final exhortation in behalf of the 45th Reunion at the Wianno Club, Osterville, on the Cape. Remember that this has a happy dividend on ending Sunday, June 11, but continuing for Sunday night at M.I.T. and on Monday, June 12, for the regular celebration of Alumni Day. It looks like five days of real fun and frolic. The reminders of our 40th Reunion show us that prizes were given to **Horace McCurdy** for being the first married, to **Barrett G. Hindes** for coming the farthest distance, to **Chuck Brokaw** for six-year-old twins, to **Tommy Thomson** for seven grandchildren, to **Bill Elmer** for two grandchildren and one four year old son, to **Ab Johnson** as most popular "fella," to Treasurer **Ev Vilett** for non-bonded honesty (!), to **George Dandrow** for outstanding big member and to **Don Carpenter** as first president and class representative. Those who excelled in golf included **Bob Tonon**, **Sam Reynolds**, **Hugh Shirey**, **Saul Copellman** and **Yard Chittick**. The prizes for tennis went to **Frank Kurtz**, **Sam Vadner**, **Conant Webb** and **Don Carpenter**. The horseshoe experts were **Herb Ham** and **Jack Liecty**. **Bill Mueser** had charge of the trip to Rockport and **Dewey Godard** took us to Salem. The clippings from the Boston *Globe* headlined our Class Gift of \$736,940 as announced by **Parke Appel** for the 1922 Professorship held by Dr. John Wulff, '41. Also noted was the election of Horace McCurdy as a life member of the M.I.T. Corporation. Because of the type of people attending, including visitors, the class song seemed to be "For He's a Jolly Good Fellow." Memories were revived of the Big Wind stirred up by the class causing the Big Top to blow

down. Class statistics indicated that there were 150 members in World War II ranging from enlisted men to generals and admirals; 100 members were presidents or board chairmen and the total group included teachers, lawyers, ministers, doctors and even scientists. One out of ten served as club officers, eight were members of M.I.T. Corporation, 40 took part as honorary secretaries, three were Fund Board members and 50 have been Presidents of M.I.T. Clubs around the world. It will be great to see you all again in June. . . . **George Holderness** of Eggers and Higgins, New York, has returned the Course IV booklet and it is now safely in the class files. He is retiring after 44 years of service on April 1. George has been a partner of this famous architectural firm for the past 15 years. Your Secretary will bring the souvenir booklet to the Reunion so that many may enjoy its numerous sketches. . . . A recent note from **Earl R. Thomas** and a card from the Consolidated Edison Company of New York announces his retirement after 45 years of various services and offices. Earl expects to continue his association on several national technical committees as well as the International Electrotechnical Commission and the International Conference on Large Electric Systems. He was in Brussels and Paris this last summer attending meetings of the latter two after which he took a month's vacation driving around Wales, England and Scotland. . . . We are pleased to have a note from **Frank H. Russell** of Needham, Mass., hoping to be at the Wianno Club in June. . . . Your Secretary has answered a letter from **Vernon E. Whitman** of Rochester, N. Y., regarding the Reunion program. Vernon has been with the Graflex Company in foreign procurement. He has been assured that all classmates will receive "the best room in the house" and no one will be above the kitchen or near the juke box bar. Vernon has heard from **Lewis P. Tabor** of Narberth, Pa., who is hoping to attend the Reunion in between his duties at R.C.A.

Your Secretary's secretary did the above before the start of the now famous Buffalo Chamber of Commerce Trade Mission. His postcards telling exaggerated stories of his visits to Ballbeck and Damascus, of camel rides to the pyramids of Egypt and the examination of the Tombs of the Kings in Luxor are being hurried to us with all the efficiency of the postal service. He assures us he will return for the 45th Reunion! With the latest dispatches from the Middle East it begins to look, however, that this is contingent upon his side-stepping the lately lost tempers of the volatile people of those romantic lands. . . . We have received the following change of address notices: **Warren D. Sherman**, Farmington, Conn.; **Platt C. Benedict**, Republic of South Africa; **Floyd J. Wilson**, Ontario, Calif.; **Elmer W. Hammond**, Los Angeles, Calif.; **Howard M. Spooner**, Summit, N.J.; **Vincent P. Ring**, St. Louis, Mo.; **James L. Truslow**, Falmouth Foreside, Me.; **Howard A. Simons**, Vancouver, B.C.; **Theodore S. Rader**, Wadsworth, Ohio; **James A. Bowers**, Wadsworth, Maine; **Randall W. Meech**, Pasadena, Calif.; **Allan H.**

Kidder, Lansdowne, Pa.; **Earl T. Heitschmidt**, San Marino, Calif.; **Yoland D. Markson**, Los Angeles, Calif.; **Cmdr. John F. Halpin**, Nyack, N. Y.; **Dr. Nathan I. Epstein**, Chappaqua, N. Y.; **William R. Scott**, Santa Barbara, Calif.; **Charles E. Brokaw**, Denver, Colo.; **James M. Waechter**, Hollywood, Fla.; **Dr. Mortimer C. Bloom**, Washington, D. C.—**Whitworth Ferguson**, Secretary, 333 Ellicott Street, Buffalo, N. Y. 14203; **Parke D. Appel**, Assistant Secretary, P. O. Box 137, Old Farm Road, Dover, Mass.

'23

On December 5, 1966, Charles M. Nes, Jr., President of the American Institute of Architects, announced that **John Ely Burchard** had been selected as a jury member for the 1967 R. S. Reynolds Memorial Award for Architecture with Aluminum. The jury selects the recipient of the award which confers \$25,000 and an original aluminum sculpture for "distinguished architecture with significant use of aluminum." . . . The *Princeton Alumni Weekly* for December 6, 1966, contains an interesting article by John Ely Burchard entitled "Life Could be Fun in Megalopolis." In a brief paragraph it states that Mr. Burchard is a Princeton parent and that he has been a member of Princeton advisory councils on physics, architecture, and the library. His books include the three-volume *The Evolving House* (with others); *The Architecture of America* (with A. Bush Brown); *The Historian and the City* (with Oscar Handlin). He is a fellow and past president of the American Academy of Arts and Sciences. For those who want to take a good look over the horizon, your Secretary recommends the reading of John's article on "Megalopolis." Here is a pertinent sample: "It is perfectly obvious that the frustrations of modern life which lead to uncivilized conduct can be eliminated by modern technology if human beings will make it possible. But this may require a new breed of human beings. These humans must be so sensible and so well supplied with reliable information that they can weigh consequences and then make rational rather than whimsical, communal rather than self-centered decisions. We have really not come very far along this road in several thousand years, if indeed we have come anywhere." . . . The following appears in *IEEE Spectrum* for January 1967 under "Planning and operation of a large power pool." **R. G. Rincliffe** (S.M.), after receiving the B.A. degree in 1921 from Yale University and the M.S. degree in chemical engineering from M.I.T. in 1923, immediately joined the American Gas Company as an engineering assistant. Subsequently he served as industrial gas engineer, construction engineer of the coke oven plant at Chester, assistant superintendent of coke ovens and, in 1928, was appointed superintendent of gas production of the Delaware Division of the Philadelphia Electric Company. In 1945 he became vice-president of electric operations and five years

later, executive vice-president and director. He has served as president and as chairman of the board and since 1963 has been chairman of the executive committee. In addition he is president and director of the Philadelphia Electric Power Company, the Susquehanna Electric Company and the Susquehanna Power Company. He is recipient of honorary degrees from Pennsylvania Military College, Villanova University, and Saint Joseph's College. . . . **Roger J. Evans**, P.O. Box 590, Trenton, N.J. 08604, represented the Institute at the inauguration of Virgil Wayne Gillenwater as president of Trenton State College on April 22. . . . *Chemical Engineering Progress* for January 1967 shows a picture of Professor E. W. Thiele, University of Notre Dame, receiving the Founders Award.

Undersea Technology for February 1967 reports that the Marine Resources and Engineering Development Act of 1966, enacted into law during the last session of Congress, provides for a National Council on Marine Resources and Engineering Development, and a Commission on Marine Science, Engineering and Resources. The Council went into action in its first meeting on August 17 with Vice President Humphrey as chairman. (UST, September) Early in January the President announced his appointments for the Commission. (UST January) The Commission is to make a comprehensive investigation of marine science and to recommend an overall program for an adequate national oceanographic program for present and future needs. This includes reviews of natural resources, applied research and engineering projects, basic oceanographic research and education and technical training, analysis of the findings and recommendations for a national science program and a governmental organizational plan. The Commission's life is to be no more than 18 months or 30 days after it submits its final report. **Julius A. Stratton**, Chairman of the Board, Ford Foundation, has been appointed chairman for the Commission on Marine Science, Engineering and Resources. A February 1967 *Wall Street Journal* reported that Standard Oil Company of New Jersey had elected Julius A. Stratton a director for its board. . . . A paper entitled "Domestic Water Supply in East Pakistan" was presented on September 8, 1966, at the Connecticut section meeting of the American Water Works Association, New Haven, Conn., by **Frederick O. A. Almquist**, Project Engineer, Camp, Dresser & McKee, Boston, Mass. A great deal of aid is currently being given by the United States to countries that have not, unfortunately, been able to reach a standard of living comparable to most other countries. A shaky economy with a rapidly growing population in these countries makes it difficult to maintain anything but substandard conditions of living. One of these undeveloped countries is Pakistan, which is newly formed, following separation from India in 1947. Many countries, including the United States, are assisting Pakistan in its efforts to become self-sufficient. Under an Agency for International Development (AID) Program, the firm of Camp,

Dresser & McKee was selected by the government of East Pakistan to furnish advisory services in water and sewage to the Directorate of Public Health Engineering. This was a four-year contract beginning July 1, 1964. Frederick had a share in this project. . . . In a letter from **Bertrand A. McKittrick** he writes, "The only thing new with me is that after a lapse of 15 years I have rejoined the Vesper Country Club with a view to playing a little golf again for the exercise. If some of my retired friends take my money away from me as regularly at golf as they do at gin rummy, I may regret the step." . . . **Royal Sterling** writes, "This winter Mary and I visited the Hawaiian Islands. One night we were sailing out of Honolulu Harbor on the SS *Lurline* when who should be next to me on the deck but **Phil Coleman** and his wife. We last saw each other at the reunion in Chatham four years ago. I am supposed to go to Greece again this spring, but Mary and I love our home on Narragansett Bay so much that I don't want to leave it. We are looking forward to seeing you and many others at the Cape next year. I can't retire because I have a tiger (Cinder Products) by the tail and I can't let go."

In a letter dated January 11, 1967, to Bertrand A. McKittrick, **José Carlos Bertino**, Capitan de Fragata Ing. Naval (R), 11 de Septiembre 927-1°-B, Buenos Aires, Argentina, forwards the following news. The items noted in parentheses may have been interpreted incorrectly by your Secretary. "I am an M.I.T. graduate from Course XIII in 1923; I have been honorary secretary of M.I.T. in Buenos Aires since 1933 when I was appointed by the late Dr. Karl Compton, then president of M.I.T. I was the builder of the M.I.T. Club of Buenos Aires in 1941 according to the ideas of the late Professor Charles Locke who was secretary of the alumni. I was married in August 1966 to Alicia Maria (Huesgo). With her I went to Japan. We left Buenos Aires the 25th of August and returned by the 18th of December, 1966. Both ways we made on the Japanese S.S. *Argentina*. We were in Japan 16 days and had the opportunity to visit Yokohama, (Tokyo), (Kyoto), (Nagoya), Beppu, and Hiroshima. At (Tokyo) we saw our ambassador, went to see the (Kokute) show and had lunch at the Imperial Hotel. I was in the American Navy one year, in 1924 after graduation, for my practice in the Fore River Shipyard (Quincy, Mass.), where they were building American battleships, cruisers, and submarines (at Groton, Conn.). I keep in touch with many good American families and some of my dear classmates: Percy Fuller, '24, **Clarence Chaisson** and (Rickards). Best regards to you and my classmates from '23." Your Secretary reminds you, Carlos, and other classmates at a distance, that our 45th Reunion next year, 1968, gives you an excellent opportunity to come back to M.I.T. to renew old friendships and to take a long look into the scientific and engineering future.

The following additional information has been received relative to the death of **James A. Henderson**. "After a long day at the office, he was a key participant in the annual meeting of the Congregational

Church of San Mateo when he suffered a fatal heart attack. From 1933-1958 he was president of United Construction Company of Winina, Minn., a large company which he organized to engage in building, highway, heavy and marine construction throughout the United States. Among its outstanding projects were major contracts at the Hanford Atomic Works, at Sault Ste. Marie and Garrison Dam, and on the Ohio Turnpike. Under his leadership United became one of the recognized leaders in the heavy construction industry and Jim himself became a nationally recognized industry leader. He was a member of the governing board of the Associated General Contractors of America from 1948 to 1958. He served as vice-chairman and chairman of the AGC's heavy and railroad contractor's division; he was chairman of the Corps of Engineers-AGC Joint Committee on Contract Forms and Specifications. He was a member of the Bureau of Reclamation-AGC Joint Committee on Contract Forms and Specifications. But in particular perhaps Jim's contributions may best be seen in some of the company's new areas of activities. He was a key member of the Aetron-Blume-Atkinson Management Committee on the recently completed Stanford Linear Accelerator Complex. He was the manager of the company's property programs at Moffett Park, in Sunnyvale, and The Villages in San José. He was a key advisor in the activities of the building division."

. . . In the January 1966 issue of the *Technology Review* you were alerted by your President, **David W. Skinner**, to the fact that plans are being made for the 45th Reunion of our class at Oyster Harbors Club—at the kind invitation of the Class of 1913 to share this beautiful spot with them. Your officers want to make this a most happy and memorable gathering of 1923 classmates. It is suggested that you start by reserving the Alumni Day 1968 period for this gala event, and definitely plan to attend. As time goes on you will be given more information and advised as to those who plan to attend. You may remember that dues have only been collected every five years. In order that your Secretary-Treasurer may handle this subject expeditiously, and be in a position to furnish the necessary funds to the reunion committee as required, it would be helpful and appreciated if all classmates would send in their dues checks for \$10.00 as soon as practicable, made out to Forrest F. Lange, Treasurer. At the same time please enclose: 1. your correct address and zip code for future mailings, 2. any ideas you may have for making the reunion more enjoyable to classmates and their families, 3. business affiliation, address and title, 4. number of children and grandchildren, 5. any news you may be able to furnish about yourself or your special interests. A good thing to remember is do it now; then it's done! . . . The Alumni Office has advised of the following changes of address: **Cecil H. Hubbard**, 123 Hamlet Hills Drive, Chagrin Falls, Ohio 44022; **F. Robert Robinson**, 30A East Center St., Rutland, Vt. 05701; **Harry E. Kent**, 4 Chester Road, Darien, Conn. 06820; **Walter Dietz**,

R.D. #1, Pennsburg, Pa. 18073.—**Forrest F. Lange**, Secretary, 1196 Woodbury Ave., Portsmouth, N.H. 03801; **Bertrand A. McKittrick**, Assistant Secretary, 78 Fletcher St., Lowell, Mass. 01852

'24

George Y. Anderson, Bucyrus-Erie Company, South Milwaukee, Wis., was chosen to represent the Institute at the inauguration of Bernard Schroder Adams as ninth president of Ripon College on May 6, 1967. Undoubtedly George was a distinguished and decorative member of the academic procession. . . . **Arthur C. Kirkwood**, Kansas City consulting engineer, got his master's with us. For some time he has been active in the National Society of Professional Engineers. This winter he was nominated for vice-president of the Society's North Central Region, and has no doubt been elected by now. . . . Some more retirements to report. After 40 years with Bemis Bag, in recent years as vice-president and director of production, **Elwood Proctor** retired at the end of December. He spent many years on the West Coast, coming back to the company headquarters in 1960. . . . **Pret Littlefield** had planned an end-of-January retirement, but that detached retina operation we told you about fouled up the timetable a bit. However, he finally got out of the surgeon's clutches, returned to the office long enough to clean things up, and made it at last on All Fool's Day. "I look forward to two vacations a year, each six months long, joining you and the other good classmates who have a work list on the blackboard. In my case when the list gets too big, I just erase the whole thing and start all over again." It is to be hoped that Pret doesn't think this is a procedure unique to him. . . . And it looks as though **Art Kemp**, with a Laguna Hills, Calif., address, has joined the procession. Although, as a hot-shot advertising man, he may have just shifted his base of operations and be busy masterminding something or other in a more salubrious climate than that of New York. . . . The **Lehrer's** Pacific Pilgrimage found them in Fiji (where they drank Kava, the local LSD, with a bunch of chieftains) and New Zealand, "more British than England," in March. In April they were wool-gathering Out Back in Australia, where they were plied with liquid refreshments at a barbeque lunch then tried their hands at boomerang throwing. Fortunately they were backward pupils, and Ray didn't lose his head. At the end of that installment they were heading for the Great Barrier Reef, then on to New Guinea. More later.

Alumni Day, as is its wont, is coming up momentarily—new and different this year, especially the evening entertainment. **Artur Fiedler** has defected to a neighboring establishment, so there'll be a mixed bag instead. Sounds interesting, hopefully with something for everyone. See you there?—**Henry B. Kane**, Secretary, Lincoln Road, Lincoln Center, Mass. 01773

'25

The Class of 1925 had a small reunion at the March meeting of the Alumni Council when President Howard Johnson made his first appearance before this group. **Sam Spiker** came up from New York to attend the meeting; and from the local area we had **Maurice Freeman**, **Fred Greer**, **Ed Kussmaul**, **Frank Turnbull**, **Will Gardiner**, **Jim Howard**, **Melvin Shikes** and your Secretary. A number of others would have liked to attend. **Harold Robichau** was leaving for a Florida vacation at the time. **Ken Proctor**, who had undergone eye surgery during recent months, is now back at work but was not able to get down from Worcester. **Mal Blake** has been in the South, stopping for a while in Dallas and spending some time in the Gulf of Mexico fishing and enjoying the sun. . . . At the time of going to press a month ago word of the death of **Theodore M. Kuss** came in. Since that time some interesting information on him has come along. He had worked in a dozen nations in all parts of the world from Pearl Harbor to South America. In 1958 he was project engineer for the largest drydock ever built at the Navy shipyard in Bremerton, Wash. The dock was large enough to accommodate the largest aircraft carrier then being designed. Perhaps the best-known achievement was his design of the "Texas Towers" which were used to drill offshore oil wells and also by the Navy as radar warning towers. The towers do not float except when they are being towed to sea and during erection. The legs are sunk to sea bottom, in as much as 185 feet of water, and the platforms are raised above the water. Ted patented the operation whereby the three legs and interconnecting bracing are assembled on shore and floated out to sea separately from the platform. After the legs are sunk to the bottom, the platform is floated between the legs and jacked up. He was assistant resident engineer on the Ambassador Bridge at Detroit and the Golden Gate Bridge in San Francisco, and chief engineer for a bridge at Tacoma, Wash. At Pearl Harbor he was involved in salvage operations of the battleships and other U. S. ships which were sunk there by Japanese bombs on December 7, 1941. Engineering assignments also took him to Panama, Trinidad, Canada and Mexico.

The *IEEE Spectrum* last fall carried the note that **Arthur L. Samuel** has retired from the International Business Machines Corporation after 17 years of service, notably in the fields of machine learning and artificial intelligence. He has taken a post as lecturer in the Computer Science Department of Stanford University. The following is quoted from the *Spectrum*. "Prior to joining IBM in 1949 he was with M.I.T. for two years, Bell Telephone Laboratories for 18 years engaged in work on electron tubes at ultrahigh frequencies, and the University of Illinois for two years. His first position at IBM was assistant manager of the Poughkeepsie Engineering Laboratory, heading research and development. He was ap-

pointed corporate research advisor in 1953, resident manager of the Poughkeepsie Research Laboratory in 1957, and director of Research Communications of the IBM Thomas J. Watson Research Center in 1961. Mr. Samuel has been editor of the *IBM Journal of Research and Development* since 1962 and a visiting professor at M.I.T., associated with Project MAC, since 1963. Among his contributions to the field of machine learning are computer programs which have enabled computers to play against checker champions with notable success; using these programs the computers "learn" from their mistakes and improve their performance as they play." . . . It is hoped that all of you noted, when you received your Alumni Association Bulletin this year, that **Ralph Gow** is slated to become an Alumni Term Member of M.I.T.'s Corporation. A note in the *Boston Herald* of April 14, 1967, indicated that Ralph, who has been president of the Norton Company, has just been moved up to become vice-chairman of the board. . . . From the Alumni Office comes the information that **Walter D. McCrea** passed away on March 7. There were no details.—**F. L. Foster**, Secretary, Room E19-702, M.I.T., Cambridge, Mass. 02139

'26

This June issue is being written with snow still on the ground in Pigeon Cove. An early April snow disappears quickly, and the crocuses must know it because their yellow blossoms are defying the white blanket. We have been out here just a year commuting to town via Volvo, and it has not been too bad even though this has been a rather wild winter in New England. Did all of you see "Chick" Kane's cartoon of **Bob Dawes** chasing the '26 bus? It is on page 77 of the March issue of the *Technology Review*. It's worth digging out your copy. A year ago we reported, "A national commission on educational television has been established by the Carnegie Corporation to conduct a broad study of ETV to define its role and make recommendations for the future. The chairman of the new commission will be Dr. **James R. Killian, Jr.**, Chairman of the Corporation of the Massachusetts Institute of Technology." This month the clipping services swamped us with news of the results of this study. Since it has been such an important effort of Jim's during the past year, we will fill you in on the recommendations as condensed from a story in the *Wall Street Journal*. "A new, nationwide system of noncommercial television, financed by private contributions and an excise tax on new television sets, was proposed by the Carnegie Commission on Educational Television. The new system would be called Public Television. It would provide cultural, news, public affairs and entertainment programs during prime evening hours and on weekends. It would be based on locally controlled educational stations rather than on a new noncommercial network similar to the British Broadcasting Corporation. To carry out the new plan,

the commission recommended the creation of a nonprofit, nongovernmental organization to be called the Corporation for Public Television. The function of the corporation would be to modernize and equip for color the existing 124 educational television stations, to help establish approximately 250 more ETV stations by 1980 and to set up new production centers for ETV programming around the country. The excise tax on television sets would start at 2% and gradually rise to 5½%. This tax would initially provide about \$40 million a year to the corporation. Eventually, as the tax and the number of sets increased, it would provide about \$100 million. A 10% excise tax was levied on all television sets from 1950 until 1965. The excise tax is one of three ways in which the Corporation for Public Television would be 'insulated from political control.' Another would be to make the corporation a private institution with a 12-man, unsalaried board, six appointed by the President and the others elected by the first six, with the chairman elected by all 12. Also the corporation would attempt to avoid central control by supporting program production by local stations and regional production centers, rather than setting up a fourth national network."

We have been saving return envelope messages from various members of the class. Space was allotted in a mailing of the Alumni Fund some months ago, and quite a few replied. The first is from **W. Sargent Graves** of Richland, Wash. "... with Vitro Engineering Company or its predecessor since 1937 specializing in engineering design of nuclear facilities and chemical production plants. Now project coordinator and supervising engineer." ... **Leonard Remington** tells us he "recently became vice-president of the Thomson National Press Company, Franklin, Mass." ... And here's a note from **Al French**, "In addition to my duties as president I am also handling the responsibilities of general manager since 1/1/66. Too much! Our company is the French Oil Mill Machinery Company, Piqua, Ohio." ... **Juan Chaudruc** sent this message, "Daughter Lusandre graduated from Western College, Ohio, last June. The load is lightening but the third generation is around the corner peeping." We have a couple more but will be prudent and save them for next month. We thought that we might skip a month without **Stark Draper** being awarded a medal, but here we go with a clipping from *Space Business Daily*, "Dr. C. Stark Draper, Institute Professor at M.I.T., has been awarded the Daniel Guggenheim Medal by the AIAA. The award cited Dr. Draper 'for contributions to aeronautical education and significant developments in new fields of aircraft instrumentation, in particular for pioneering inertial guidance techniques making possible en route navigation independently of earth references.'" If these notes reach you in early June, this will remind you that June 12 will be Alumni Day and we hope to see many of you then. Meanwhile we will say cherrio until July, the final issue of the season.—**George W. Smith**, Pigeon Cove, Mass.

'28

Without **Jim Donovan** and **Charlie Worthen** we'd have no notes for this issue. From Jim we learned that on a recent trip to California he enjoyed the pleasure of an afternoon and evening with **Marjorie** and **Bill Bendz**, highlighted by steak cooked California style in the open. Bill remains immersed in electronic work with Lockheed. At home he has an excellent workshop and is always making things. Marjorie is an officer in the national organization of P. E. O. In addition she has garden club, plays the piano, takes care of a large number of cats, and is very, very much interested in their grandchildren. Incidentally, daughter Carol lives in Westport, Conn.; their son Walter lives near them in California. Jim reports that while in Los Angeles he talked with **Hall Hibbard** and **Walter Ramsaur** on the telephone. Hall was on his way to Palm Springs for a bit of a holiday. Walter reported that he works hard. ... **Charlie Worthen** sends in a clipped obituary of **Gilbert Smiley** of Wellesley Hills, Mass., who died on April 4. He is survived by wife, Betty (McKinney) Smiley, and two daughters, Mrs. James C. Adams, Jr., of South Glastonbury, Conn., and Mrs. Robert C. Adams of Duxbury, Mass. He also left six grandchildren. Memorial services were held at St. Andrews Episcopal Church in Wellesley, Mass., on April 7. Charlie's note follows: "Gil Smiley was a member of the Class of '28 but left before getting his degree in the spring of 1928 in order to take a job with the Sampson Electric Company, of which Professor Edward L. Bowles, '22, was at that time chief engineer. Later he was a partner in the General Control Company which was located on Soldiers Field Road, Cambridge. In the early 1940's he joined the development engineering staff of General Radio Company where he remained until his death last week." ... From the *Detroit News*, Detroit, Mich., we learn that **Carmer Criswell** died on February 28 of this year at the age of 63. He was Course II with our class and later received his master's degree. He had been employed by General Motors Corporation for 15 years, and at his retirement in 1964 he was assistant head of the General Motor's Research Department. Memorial services were held at the Jefferson Avenue Presbyterian Church in Detroit. ... Hear this, hear this, hear this, your Secretary speaking. If you think class notes are worth reading, you must send us news items now and then, even if they only consist of your latest golf handicap, a recent automobile



Charles B. Egolf, '29

'29

We have a news release dated February 7, 1967, from Rohm and Haas Company in Philadelphia about the retirement of **Charles B. Egolf** after 36 years of service with the company. He was assistant supervisor of the technical service department at the time of his retirement, and his former positions included being assistant production supervisor, a development engineer in the plastics improvement and development laboratory, and head of the plexiglas process improvement laboratory. His contributions to the success of the company were recognized at a farewell dinner attended by his many friends and associates. The Egolfs reside in Philadelphia. ... **Wayne Koppes** is technical director of the National Association of Architectural Metal Manufacturers and is the author of the *Metal Curtain Wall Manual*. The November 1966 issue of *Architectural & Engineering News* carries an informative article by Wayne entitled "Avoiding Trouble with Curtain Walls." In addition to his work as an architectural consultant, we note he is also on the faculty of the School of Architecture at RPI. ... Academic regalia has been ordered for **William Jones** of Charlotte, N.C., who will represent M.I.T. at the Centennial Convocation at Johnson C. Smith University on April 7, 1967. Also **Louis Southerland** of Austin, Texas, will be representing the Institute at the inauguration at Mary Hardin-Baylor College on April 25. ... **Gordon Williams'** name appeared in a news release from the Council on Library Resources about their pilot project for a proposed national program to preserve brittle books. As director of the Center for Research Libraries, Gordon is spending several months in Chicago studying and planning a program for dissemination and preservation of research library materials. "Brittle book" is defined as the "library world's catchword for a volume printed on paper that disintegrates with age." From information reaching us from other sources, the "brittle book" question is highly involved and technical. There seems to be no question that excellence of initial paper makes for longevity, but the specific factors which contribute to "excellence" apparently are still the object of much research. ... Remaining questionnaires include one from **Leland Francis Powers** who is a consulting construction engineer, principally for casualty insurance companies, claims departments, and his residence is in Wellesley, Mass. ... **Norman Earle's** home is in West Boxford where he has 12 acres of land, and he extends a kind invitation to classmates to visit him if ever in that vicinity. Norman is engineering department chief of Western Electric Company in

North Andover, Mass., with whom he has been associated since 1936. The Earles enjoy winter trips to Hollywood, Fla., and Norman's hobbies include golf, gardening and fishing. . . . From the Alumni Office we have notice of the death of **Frank Stratton** in January 1964. Frank was associated with the Boston Police Department. Hope to see many of you on Alumni Day, June 12. Best regards.—**John P. Rich**, Secretary, P. O. Box 503, Nashua, N.H.

'30

We have at hand a lyrical note from **Yicka Herbert** written from Dubrovnik, Yugoslavia, which is said to be "one of the most enchanting places you can imagine." At the time Yicka wrote he and Maryan were making a leisurely trip along the Dalmatian coast from S to O, the letters representing place names that I was unable to decipher. After reading Yicka's encomium on the scenic splendors of Dalmatia and its low cost of living, Marion and I definitely added it to the list of places we hope to visit. To descend to more mundane matters, Yicka and his partner own and operate the Franklin Paint Company in Franklin, Mass., which specializes in road paints for which there is a "steady and expanding market." Those of you who attended the 35th Reunion will recall that the Herberts have three sons, 10, 12 and 14 years old. So far as my records indicate, Yicka's allegation that no one in the class has younger children is not subject to challenge. Yicka reports having recently seen **Jim Morton** who is with Loomis-Sayles in Boston and **Eddie Hill** who is an M.D. and recently moved to Solon, Ohio. . . . An article in the January 1967 issue of the *Washingtonian* discloses that there is an exhibit of **George Nakashima's** furniture at the Carderock Springs community in the Bethesda-Potomac area. As previously reported in this space, George has a studio at New Hope, Bucks County, Pa., where he makes handcrafted furniture that has attracted wide interest. . . . **Willard Morain**, who is chief cryogenics engineer at Cooper-Bessemer Corporation, recently gave a talk entitled "The World of Cold" to the Newark, Ohio, Industrial Management Club. . . . **Charley Dwight** has been named treasurer of the University of Hartford, in which capacity he will be responsible for "financial planning and fiscal administration of the University, including the operation of the physical plant." . . . **Wayne Hertzka** has his own architectural firm, Hertzka & Knowles, in San Francisco. The Hertzkas have a son Edgar who is a junior draftsman in the firm. . . . **Mason Hanes** is with Hughes Aircraft Company in Fullerton, Calif. He emphasizes the fact that the Fullerton plant is "radar oriented" and not engaged in aircraft manufacture. The Hanes have three daughters and a son: Valerie is married, Judy is a sophomore at Pitzer College, and Martha and Carl are in high school and junior high school respectively, in Whittier, where the Hanes

live. . . . **Win Hartford** is a senior scientist at the Industrial Chemical Division of Allied Chemical Corporation in Syracuse. His work involves supervision of various research and technical projects. The Hartford's son Douglas graduated from St. Lawrence, received an M.S. from Syracuse (radio and TV) and is now a 2nd Lt. and command officer at Pueblo Army Depot in Pueblo, Colo. Their daughter Janet graduated from St. Lawrence last June as the only female geology major in the class of '67. She plans to do graduate work in geology. Win is active in the Central N.Y. M.I.T. Club, and the Adirondack Mt. Club and does choral singing with church and community groups. . . . Changes of address: **Robert T. Armstrong**, Celanese Corporation of America, 30 Park Avenue, New York, N.Y. 10016; **Capt. Joseph E. Rehler**, Hg. U. S. European Command J-4, APU, New York, N.Y. 09128; **Charles M. Twelves, Jr.**, 1607-86th NE, Bellevue, Wash. 98004; **Herbert L. Wampner**, 2135 Belmont Avenue, San Carlos, Calif. 94070.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N.Y. 10036

'31

The following most welcome news has been received from **Bob Fleming**, now retired from the Army as well as from the Governorship of the Canal Zone. Bob writes: "I retired from the Army on January 31, 1967, by operation of law, having reached the mandatory age limit. For several months I had held the lowest serial number in the active Army, and when I retired was the last member of my West Point class on active duty and the active Army's oldest old soldier! On the same date the President accepted my resignation as Governor of the Canal Zone by a flattering letter which is now framed on my office wall. Heretofore, the Presidential appointment as Governor of the Canal Zone has been for four years. I was retained "at the pleasure of the President" for an unprecedented fifth year, and when I left the Zone had served on the Isthmus of Panama in a responsible and sensitive position longer than any other American except my first predecessor, General Goethals who built the Panama Canal. Two days prior to my departure the President of Panama presented me with that country's highest decoration which the Army, the State Department and the White House had authorized me to receive. In a surprise addition to that ceremony Panama also presented my wife the same decoration, one grade lower. Both of us were humbled; I was the first Governor of the Zone so recognized by Panama in 25 years, and she is the first Governor's wife ever to be honored. The day before we left, at a farewell review for which I wore a uniform for the first time in five years, the Army presented the Distinguished Service Medal, and at Fort Belvoir, Va., outside of Washington, the Army iced the cake with a retirement ceremony and reception which most of our friends in the Washington area attended. Being in the Army we have

never had the chance of putting down roots, and since we have been outside of the United States for nine out of the last ten years, we have been unable to make any plans for what we would do when time ran out. Now we are footloose and fancy free. Whether we end up in New England or California is a toss-up, and there's lots of territory in between. When we have a permanent location, we will reassemble the paraphernalia of a lifetime which has been stored around the country for the last five years." Congratulations and all good wishes to Bob and Eleanor from the Class of '31. . . . Congratulations also to **Dave Bernstein** upon his election as president of American Biltrite Rubber Company. Dave, who is also chairman of the board of American Synthetic Rubber Corporation, joined American Biltrite in 1932 immediately after his graduation from Tech and has been vice-president and director since 1954. . . . **Dean Gordon Brown**, who seems to be able to accomplish so much in a 24 hour day, has also made the news again as one of the sponsors of National Engineers' Week.—**E. S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn.

'32

I will not report on the Reunion, which will be "happening" when this issue is mailed, other than to tell you of two letters received back in March. **Thomas H. Jenkins** wrote, "At present it is very doubtful that I will be able to attend our Class Reunion this June. I regret this very much for it would indeed be a pleasure to renew many friendships." Tom's address, Bechtel International Company, 37 Avenue Pierre ler De Serbie, Paris 8, France. . . . And the other from **James J. Robson** saying, "I won't make it but surely wish you a wonderful get-together." Jim's return address, Bechtel Corporation, San Francisco, Calif. Both our classmates and the Bechtel Corporation seem to cover the globe. . . . If there is anything you want to know about our battery-powered society I can remind you that **Edward J. Dwyer** is president of the Electric Storage Battery Company of Philadelphia. It appears to be a glowing industry. . . . Through publicity on the appointment of **Dr. Arthur G. B. Metcalf** as chairman of the President's Council of Franklin Pierce College in New Hampshire, which has the function of making an intensive review of the goals and objectives of the College, we are reminded that Arthur is president and chairman of the board of the Electronics Corporation of America, Cambridge, Mass.; a trustee of Boston University and several charitable institutions. . . . **Paul A. Robert** has been appointed director of operations and elected vice-president of Access Corporation which I think is in Wheaton, Ill. He was previously director of quality assurance for Univac-Sperry Rand Corporation, president of KDI Corporation, general manager of Precision Products Division of Gruen Industries and for 23 years was with IBM. He is a founding member and past president of American Society for Quality Control, author of

the book *Precision Measurement in Metal Working Industry* and an editor of the magazine *Industrial Quality Control*. . . . The Massachusetts Safety Conference in March brought **Roy C. Haeusler** to Boston on the Traffic Safety Panel discussing the role of the vehicle in traffic safety. Roy is chief engineer, automobile safety, with Chrysler Corporation, Detroit. . . . **George H. Sherwood** who has been a Boston architect for the past ten years has been elected a director of the Merchants Cooperative Bank of Boston. George has been designing a wide range of buildings including shopping centers, fire stations, municipal swimming pools, several fine residences and the restoration of two 17th century buildings on Cape Cod. . . . Information has been received of the death of the following classmates: **Frederick A. Cornell** in Bristol, R.I., March 26, 1966; **George J. Brady** in San Francisco, May 19, 1966; **Robert W. Wright** in Detroit, Mich., September 23, 1966; **Maurice Cook** in Freeport, N.Y., November 15, 1966; and **Winthrop H. Towner** in Branford, Conn., February 20, 1967.—**Elwood W. Schafer**, Secretary, Room 13-2145, M.I.T., Cambridge, Mass.

'33

While visiting with some New Englanders at the Mexico City M.I.T. Club 19th Annual Fiesta, I found that as of March 8 and 9 spring had not yet arrived in our home country. It was suggested that some of the participants were in Mexico for just that reason. Perhaps the Club's notes will have more details. I had just returned from mailing the May notes when I found a short note, enormously welcome, from **L. W. (Bill) Moore** who is president of American Oil. I had written Bill to ask his permission to inform our classmates who so wished to write to American Oil for copies of that fine speech Bill made in Chicago, paraphrased in the February notes. **Emerson Norris** of Great Neck, N. Y., had already asked if the speech could be made available. Bill's note says that any who wish copies should write directly to the main office of American Oil, Chicago. Bill talks only when he has something to say, and he allows that there is not much to say about himself. But I will venture to disagree. Here is a man who is happily married, with three grown daughters, and two grandchildren. This, says Bill, makes him just about conventional. He is, further, a sailor on Lake Michigan. His boat is a 30-foot sloop, but no details are given. The Moores vacation in the Caribbean, at a spot not named. So outside of sailing, business, and vacationing in the tropics Bill is just a "dilettante"; so says the man himself. . . . Now comes one who has not been accused of being a shrinking violet, **Dick Morse**! Dick, it says here (a press clip), has been made chairman of a "high powered panel on electrically powered vehicles" appointed by the Department of Commerce. This committee is to survey the problems and potential of this type of vehicle and to determine how such vehicles would stack up against the pres-

ent type now in use, particularly from an air pollution standpoint. . . . Though I hope to do a lot better later on, I have a cordial note from **Dick Armstrong** of West Chester, Pa. Dick is now owner of the company of the same name, makers of crystallizers and comparable chemical plant equipment. They are also doing considerable work in the chemical plant and refinery field overseas. Perhaps later we can get some details on this project. I am sure that Dick has placed the Notes section in his follow up for future business. Dick has two sons, one of which is with him in the Armstrong company after having gone to Wesleyan and then to the Wharton School. Dick tells me that this son is Junior, but he forgot to name the other who is a graduate of Williams and who then went on to M.I.T. where he took his B.S. and M.B.S. in Courses X and XV, respectively, last year. He is now with Dow Chemical as a project engineer at Midland. Dick says he does very little civic work, but he is a director of the First National Bank of West Chester. . . . We have a short one from **Dana Corrough**, architect from Colorado Springs. This is an excellent illustration of not so rare cases of fellows leaving the Institute before taking a degree, but going on to another school and taking a degree there. Dana allows that his former architectural practice in Stockton, Calif., turned out to be a 24 hour per day bit, so he went to Colorado seven years ago and got into Civil Service as a consulting architect with the Air Defense Command Headquarters at Colorado Springs. He travels more than plenty, trouble shooting on Air Force buildings, and is getting close to the United 100,000 Mile Club. Dana attended Grinnell and took a degree in 1924, and was for a long time Class Agent. Although he doesn't say where, he took a masters about 10 years ago, and is thinking seriously of finishing up and getting his doctorate. Incidentally, the Corrough living room is 6365.5 feet above sea level (note the point 5). They are planning to make the 35th if all goes well. . . . It appears that **Leo Pelkus, Inc.**, of Wellesley Hills, manufacturers of Electric Space heaters, has appointed **Stan Walters** as their New Hampshire representative. He is from East Sullivan, way across the state from Exeter. He would have to pass through here on his way to Hampton Beach. . . . After too long a period of time, we hear again from **Bob Winters**, presently Canada's Minister of Trade and Commerce who in January spoke at the inaugural dinner in San Francisco of the newly-formed Canadian American Association of Northern California. The World Affairs Council and the Canadian American Association were joint sponsors of the meeting at which Bob spoke. His speech was entitled, "Canada 1968 and the Years Ahead," and he went on to discuss his country's future trade relations with the U. S. Now this is the sort of speech that Bob used to send me, and I always enjoyed every word he had to say and occasionally took the opportunity to quote. The press article goes on to give a short biographical sketch of Bob's long and distinguished career. Bob assisted in open-

ing the new Commercial Division of the Canadian Consulate General, also in San Francisco.

A release from the *Air Transport World* features a story on Aloha, the Hawaiian Airline mentioned in this column earlier. **Frank Der Yuen** is vice-president-administration-secretary of the company. The article is entitled, "Aloha-Airline Turnabout to Profit." To quote: "When President Ken Char moved into the top spot from executive vice-president, he looked for a good right-hand man to replace him and found that man in Frank Der Yuen, an M.I.T. man, graduate in aeronautical engineering." Frank was formerly with Northwest Airlines, and later was with Lockheed Air Terminal, Inc., as development planning manager. Further, while with Lockheed he headed a consulting project for the State of Hawaii for six years. I was in hopes of having some small quote from Frank and have written him making this request. . . . An address change prompted me to drop a line to **Alvin Bell** now of Middletown, Ohio. It appears that Al is now in blast furnace operations with Armco, striving for "peak efficiency". Al says that after 26 years at one address it was not easy to decide what to keep and what to throw out. He is regional chairman of the Alumni Fund for the area, which reminded him that he is just a bit behind in this effort. And he tells this old Ohioan that Middletown is now a college town, and wife Eleanor is a "late blooming co-ed" at the new branch campus and hopes to finish her degree requirements in 1968. That's great, Eleanor. The Bells have a son in Europe, and a married daughter has two sons. This gets Al into the club to join quite a distinguished group. Son-in-law is a professor of chemistry at the University of Kentucky.

Another address change comes through from **Frank Coyle**; this time he has gone to Texas. Frank has moved to Fort Worth and is still with George A. Fuller Company, in construction work. They are now building the engineering and office building for General Dynamics Corporation and will build further. This building will house 6000. When they broke ground, Frank sat near Governor Connally and next to Colonel Mumford, Air Force Liaison, and the president of General Dynamics (I couldn't read the name). The Coyles are finding it tough to move as they had the ultimate in fine apartments in Shreveport, complete with gardens and such. Too bad, Frank, but as you say, one must follow the dollar, no? Frank expects to attend the 35th, and I quote, "I just loved those 40¢ drinks." Now where did he find such drinks? I cannot remember any such, and I attended all reunions but the 10th. Frank, you show up, and I will pay the difference for one night only. . . . Now we have a word from **Jack F. (for Frost) Andrews**. The great news from Jack is his impending marriage to Mrs. Jeannine Johnson Mueller who apparently shares many of Jack's interests, and has added a few of her own it says here. As I recall it, Jack was always sort of an athletic type, golf, tennis and such. Now, it is figure and dance skating. They are to be

married on April 22 (this year) and plan to live in Princeton which, I gather, has the skating facilities. Jack has already passed the preliminary dance skating tests, and next year will be tested in the post graduate section, or whatever. They will bring the tennis rackets to the reunion next year and, Jack, the golf sticks too as they have a fine short course at Chatham Bars Inn. If you play golf, I can bring along my wheelchair cart. Jack goes on, no more seriously but in a different vein, to tell about his professional work which has been for years with the State of New Jersey Highway Department, but he is now director of maintenance of the new State Department of Transportation. It was the very first such department in the nation. Transportation, in the department sense, covers far more than highways; it also goes into railroads, buses, and aviation, and his department is busy, especially with the passenger problems of the railroads in the state, and is delving at some length in the capital improvement end of railroading. They are also involved in what Jack calls the controversial jetport project of the Port of New York Authority, in which **John Wiley** is also involved. John is Director of Aviation for the New York Port Authority, says Jack. Inasmuch as I am little more than scarcely aware of any controversy, perhaps John Wiley can help us out via the notes later. Jack seems to have dropped out of M.I.T. Club affairs, principally because he lives a bit too far away from any one of them. Also, may I observe, that one does not get married every day. He is looking forward to the reunion next year, and also the Monday Alumni Day that follows. So am I, Jack, and will see you. Jack announces, in passing, that he has a daughter in Boston at Katherine Gibbs. Fine, Jack, but if my memory still works, I thought that you had three or four daughters.

I have just returned from the April "M.I.T. Center of New York" meeting, held jointly this winter with the Harvard Club and at the Harvard Club. The club serves a rather marvelous buffet dinner preceded by cocktails in the lounge. They had a fine crowd present at the meeting, and it probably was about 60-40% Harvard-M.I.T. which is about natural with the meeting held in Harvard quarters. This meeting is the second last in a series sponsored by both organizations, and it appears that it might well be done another year as it has been quite popular. There were four of the 1933 variety of Alumni present, all dyed in the wool M.I.T. enthusiasts, **George Henning**, a Class Vice-president; **Ed Goodridge**, President; and **Dayton Clewell**, term member of the M.I.T. Corporation. Day made a short report (to me) on having seen **Beau Whitton** somewhere or other, but had little news from him except that he had heard from me. Goodridge and I had a long discussion on silent classmates, and agreed that twas ever thus, and so what? Personally, it is necessary that I hear from the boys occasionally, but I would be pleased to have every one of the fellows send in a 100 or more to the Alumni Association every year and

ignore me altogether. In the long run, whatever I do is done for the Institute, even though the Class happens to come in between. Ed appears to be in good health and is busy starting another business, on which I cannot report without prior permission. Perhaps he will allow me to use what I have come July issue. Anyway, all three of those fellows look well, and it is my hope that they continue. Finer men would be hard to find. And they are loyal to the Institute 100%. Now, men, there might well have been more classmates present, but if so they were invisible. In talking briefly with a member of another class, we both agreed that there must be dozens of Alumni in N.Y.C. every night of the year, and agreeing on this, is it not too bad that more out-of-towners do not take advantage of this fine opportunity and effort on the part of the Institute! It is called the M.I.T. Center of New York, and any and all Alumni may belong to it, in some manner or other. I won't spend time selling the idea except to call attention to the fact that every dime the individual spends is tax deductible, including dinner, but not including early refreshments. . . . We have a few address changes, and as always any classmate is entitled to any of these new addresses and has only to ask for them from me or the Alumni Office. The persons to whom we refer are: **S. Alvin Bell, X-A; Raymond L. Brown, VI-A; Frank S. Coyle, II; Professor David B. Smith, VI; Captain T. Gorman Byrne, I; Dr. Robert Heggie, V (NR); Col. George E. Hughes VI (NR); Robert B. Mills, III (NR)**. We wish to call attention to something that happens in the fall (September) which, in spite of all the Institute can do, seems to be either unknown to or ignored by too many of our Alumni, and in this case too many men and women of 1933. I refer to the Annual Class Officers Conference, the eighth of which is next, and immediately following this conference comes the Annual Alumni Seminar. Some fellows attend both, but it is evident that all of us may attend at least one. Praise of the Class Officers' Conference might well be a little like gilding the lily. It is, and all agree, a great idea, well-managed, well-attended and fully appreciated. I intend to take in the Alumni Seminar this fall as I have not before done so, but have heard so much good about the event as to find it difficult to ignore. Again, we hear nothing but the most lavish praise of this fine effort. To close this set of notes, we wish to mention the coming 35th Class Reunion which comes up June 7-9, 1968, and the 1967 Alumni Day June 10, the Monday after the 35th. Unless I chance to forget it, this announcement will appear at the end of these notes from now on. Next issue I will expand a little on the committee for the 35th which is now in high gear, and a good one it is. President Goodridge will write the class (will have) late in April, and then he or **Jim Turner** will write the class several times more as the need becomes apparent or following a procedure set up, through experience, by the Alumni Office. If you have not already done so, please send in the class dues of \$5.00 mentioned in Ed's

letter to **George Stoll**, Treasurer, Taylor Street, East Pembroke, Mass. 02336. George has complained that, though Treasurer, he has had no money to handle. So let's give him some to play with. Ed's letter will have explained why the committee needs the money, so we will not go into that here. Incidentally, Ed says that the \$5 is only a \$1 per year set up, and we must not forget that after the 35th we must start preparing for the big one come 1973, the 40th. That's it, fellows and gals, and I mean gals as I am starting right now to get as many of our coeds to this reunion, complete with husbands and grandchildren, as is possible. I would welcome nominations for the ladies chairman office by mail; see address at end.—**Warren J Henderson**, Secretary, Drawer H, Exeter, N. H. 03833

'34

At the suggestion of **Carl Wilson, Frank Baxter, Jinx Callan, Roger Coffey, Sam Groves, Norman Krim, Henry Morss** and Carl all had dinner together at the M.I.T. Faculty Club on February 27. Roger Coffey mentioned that **Leo Carten's** daughter will soon graduate from Harvard Business School with her M.B.A. Jinx Callan had a visit from **Bob Roulston** in February; Bob is now with Perkin-Elmer in Connecticut. . . . **Si Malkin** brings us up to date, "worked for Raytheon Company first as director of engineering laboratories for the Sparrow Missile Program, and currently as a senior facilities engineer." He and his wife Jeannette are proud grandparents of two grandsons, who they feel are M.I.T. prospects for the class of 1979 and 1980. Celia Malkin Brown, their mother, attended Rhode Island School of Design. Son Stephen is happily married to a math major from Jackson, and currently a computer programmer at the Harvard Computation Center. Steve is scheduled to receive his doctor's degree in mechanical engineering sometime this year. He received his S.B. in 1963 and his S.M. in 1965 at the Institute. He is a member of Tau Beta Pi and Sigma Xi. . . . A news release from Singer dated January 30, 1967, announces the retirement of **H. Neal Karr** as vice-president and director after 28 years of service. (See photo on page 86 of May Review.) "Mr. Karr joined the Singer organization at Bridgeport, Conn., in 1938 as assistant plant superintendent. He subsequently served as general manager of the Company's factory in St. Johns, Quebec, and moved to the executive offices in New York in 1954. He was made an assistant vice-president for manufacturing in 1955 and a vice-president in 1958. He was elected to the board of directors in 1962. Mr. Karr was appointed general manager of Singer's Special Products Division in 1959. Five years later he became general manager of the Technical Products Division and in 1965 was appointed President of Singer Company of Canada Limited and General Manager of the Company's Canadian Division. Mr. Karr is married and has two children,

Judith and James. Mr. and Mrs. Karr are members of the Nutmeg Curling Club in Darien." . . . We were saddened by the news on March 23 of the sudden death of **Bob M. Becker**. In our days at school Bob was our class Secretary for three years and also managing editor of *VooDoo*. A newspaper story of his death reports him as a partner in the Boston engineering firm of Linenthal, Becker and Eisenberg, Inc. He was the structural designer for the Museum of Science buildings and several buildings at Brandeis and at Harvard, and was a former member of the Harvard faculty and an instructor at Lowell Institute of M.I.T. During World War II he received a citation from the Navy for the design of radar installations guarding the continental coastline. Bob was a fellow of the American Society of Civil Engineers and was a member of the Boston Society of Civil Engineers, Tau Beta Pi, and the Stein Club. He leaves his wife, Sylvia (who helped write and sing the songs at our 30th), and four daughters, Mrs. Judith Alland of Belmont and Suzanne, Margie and Deborah. In recent years Bob enjoyed woodworking, travel to the Caribbean, photography and his extensive collection of tape recordings.—**Norman B. Krim**, Secretary, 15 Fox Lane, Newton Centre, Mass. 02159; **W. Olmstead Wright**, Secretary, 1003 Howard St., Wheaton, Ill. 60187; **James P. Eder**, Secretary, 1 Lockwood Rd., Riverside, Conn.; **George C. Bull**, Assistant Secretary Mid-Atlantic, 4961 Allan Road, Washington, D.C. 20016; **Kendrick H. Lippitt**, Secretary, 8735 Delgany Avenue, Apt. 211, Playa DelRay, Calif. 90291

'36

From **Al Gray** I have received a delightful three-page account of their eight months of living on the Italian Riviera. The address is Via del Lago, 5/4; Pineta, Arenzano (Genova) and the town is about 15 miles from Genoa where Esso has sent Al. Their daughter is in school in Switzerland for her last year of high school. In a Fiat Coupe they have journeyed to Venice, Florence (just before the flood), to Monaco, Nice and Cannes, and in January for a week of vacation to Munich. In spite of inclement weather Al and Kate saw the Krone Circus and spent an evening at a Bavarian beer garden with the usual hoom-pa-pa singing and music performed by gentlemen in short pants and long socks. The best evening was spent at the famous Hofbrauhaus where most of the clients were in costume—some of which were most pleasing to two tired (?) old eyes. We met up with some jolly people, one of whom named Rosie speaks English and somehow invited herself to Arenzano for her vacation next summer. We certainly hope that all summer invitees to our modest home don't all show up at the same time!" Al further reports that between periods of work they have visited the wine country and had some excellent skiing. If any of you are traveling that way I am sure Al will be glad to hear of

it. I've made a mental note in case some of our plans materialize. . . . **Pete Peterson** has sent a clipping from the Schenectady *Gazette* about **Charlie Betts**. He was a candidate for councilman in Glenville, N. Y. Charlie is vice-president of the Hanson Construction Company in Scotia. By now the election is a thing of the past and we can hope that our candidate was successful. He has been active in community affairs but this was his first try at elective office. . . . Address changes include **Robert Haynes**, Route 2, Box 204, Timberlane, Lake Wales, Florida 33853; **Morris Lepes**, 1439 Highland Avenue, Fall River, Mass. 02720; **George Putnam**, RD #2 Oakland, Maine 04963; and **William I. L. Wu** in Westport, Conn. 06880 at 44 Little Fox Lane. I hope that soon after you read this I will be seeing some of you at M.I.T. for Alumni Day. I attended a recent meeting of the Alumni Council as a guest of a sister alumna. **Eli Grossman** and **Vince Estabrook** were among those present. President Howard W. Johnson was the speaker.—**Alice H. Kimball**, Secretary, 20 Everett Avenue, Winchester, Mass. 01890

'37

Karl P. Goodwin has just been appointed to the Southeastern Massachusetts Technological Institute Board of Trustees. Karl has been associated with Acushnet Process Company for 28 years. He began as a draftsman in the engineering department and is now vice-president and general manager. He is a member and past president of the Wamsutta Club, a member of the Country Club of New Bedford and a director of Massachusetts Blue Cross. In 1961 he was elected 2nd vice-president of the New Bedford Five Cents Savings Bank. He is a trustee of St. Luke's Hospital and has served on United Fund Committees. Last August he was named by Governor Volpe to a five-member advisory committee to assist the commissioner of administration in selecting architects for state jobs. . . . **Leo Tarasov**, research associate of the Norton Company, Worcester, Mass., recently spoke to the Louisville, Ky., chapter of the American Society for Metals on "Interactions between Grinding and Metallurgy." Leo is a registered professional engineer and a past president of the Worcester Engineering Society. . . . **Vladimir Haensel** recently received the Perkin Medal for outstanding accomplishments in applied chemistry. . . . **Floyd Schultz**, Rear Admiral U.S.N., has just retired after 35 years of service and will be going to work as plant manager for the Ingalls Ship Building Division of Litton Industries in Pascagoula, Miss. For the past five years he has been commander of Puget Sound Naval Shipyard in Bremerton, Wash.—**Robert H. Thorson**, Secretary, 506 Riverside Ave., Medford, Mass. 02155; Professor **Curtiss Powell**, Assistant Secretary, Rm. 5-325 M.I.T., Cambridge, Mass.; **Jerome Salny**, Assistant Secretary, Egbert Hill, Morristown, N.J.

'38

Interruptions in the springtime chores of a householder are even more rare than that "day in June," but there was just such a welcome respite in a call from **Hal Strauss**, in Rochester as the watering stop between Los Angeles and Huntsville-Washington! While this particular trip was on a spacecraft assignment, Hal continues his community service on the California State Board of Registration for Civil and Professional Engineers, and this year is president of the California Society of Professional Engineers. Wearing these many hats, his travel schedule is complex: within California for the State Board and for the Society, to Michigan a short time ago for the conference of State Presidents of Professional Engineers, and far-ranging for Hughes (although so far only within the lower atmosphere). In his licensing capacity Hal reviewed **Ira Lohman's** application a short time ago, and reports that Ira's personality and savoir faire in personal interview persuaded the Board to recognize his New York license in California. Ed Strauss has returned to M.I.T., Hal reports, after two years at Hughes Tool Company. Ed decided to bolster his Course XVI training with some graduate work in XV, and thereby provided the ideal clinching argument to bring Hal and Henrie to Reunion next June! Susan, meanwhile, is a junior at the State University in San Diego. . . . **Lou Bruneau** and **Don Severance**, as an aftermath of a Reunion planning session which will be detailed in your direct mail, pass along two newsworthy clippings: **Fred Ray** has been named manager of the facilities engineering division of Mobil Oil Corporation's engineering department. Fred joined Mobil immediately after graduation as a process engineer in the R & D department at Paulsboro, becoming group leader in 1944 and assistant supervisor in 1950. In 1952 he came to New York as supervisor of technical services of the refinery engineering division, was named supervisor of process service in 1957, chief engineer for the petroleum processing development department in 1961, and process engineering manager in 1966. Fred retains his active involvement with the Boy Scouts, as well as his "almost continuous service in male choruses or church choirs." . . . **Fred Forman** has announced the engagement and planned June wedding of his daughter Pat to Sanford Rederer, Jr. Pat is graduating this spring from Rutgers, and her fiancé from Hamilton.

"The establishment of Muther International, Zurich Switzerland, as a European affiliate has been announced by **Richard Muther** and Associates, Inc." reads a rather calm announcement that conveys none of the excitement these international operations have brought to Dick and Louise! With over 100 projects in six countries this year, Muther and Associates continues its specialization in materials handling, layout planning, and human relations for business, industry, and government. "Muther International

will provide a central European office where we will be able to serve foreign clients better," Dick said in describing the office as a hub for existing affiliates in Oslo, London, and Tokyo. Further negotiations are under way with prospective representatives in France, Italy, Australia, and New Zealand. "From Zurich we hope to sponsor international training programs, seminars, and publications for industry. Switzerland is a natural center for international training programs and consulting activities in our fields," Dick observed. "The European acceptance of our methodology has been expanding consistently. We hope by 1968 to have a major staff enterprise in Zurich." . . . "Space Forms in Steel" was the subject of an IASC sponsored lecture at Tufts last fall presented by **Kentaro Tsutsumi**, now a Professor at Tufts. He was assisted by **Frank Heger**, '48, William Little, '57, and another associate who is an ausländer. The four lecturers reviewed the development of unusual roof designs in steel, as well as established a booklet of design examples suggesting numerical approaches to the analysis of such structures and computer solutions of suitably complex relationships. . . . As you note plans for the current June 1967 activities in this issue, act now to set aside June 8-9, 1968, in Cambridge for you know what! Splurge, as a matter of fact, and allow yourself enough time to arrive on the 7th for the fullest redevelopment of friendships, as well as reserving Alumni Day on the 10th for a new look at the old camp grounds.—**Frederick J. Kolb, Jr.**, 211 Oakridge Drive, Rochester, N.Y. 14617

'39

First news item for the month of June, appropriately, is from Mr. and Mrs. **William F. Pulver**, XV, announcing the marriage of their daughter Joyce Thorn to Timothy Tucker Dow in Berkeley, Calif., on March 31. Thank you for the news, Bill and Adie. . . . **Aaron M. White**, XIX, 177 Varick Road, Waban, Mass. 02168, wrote that he had been actively looking for a new job in the Boston area, and he has found one quite to his liking: he is with Honeywell, in the computer industry. Aaron says that he has been involved in a management development program based on a book called *The Managerial Grid* by Blake and Mouton, and he recommends it highly. . . . **Richmond W. Smith, Jr.**, VIII, has recently been appointed chairman of the Department of Medicine at Henry Ford Hospital. After leaving M.I.T., Richmond went on to the Yale University School of Medicine, finishing in 1942, and interned at Henry Ford Hospital during 1942 and '43. From 1946 to '49 Dr. Smith taught at New York Hospital as Cornell Research Fellow Endocrinology Instructor in Medicine, and returned to Henry Ford Hospital in 1949 becoming chief, division of endocrinology in 1953. . . . **Norbert L. Kusters**, II-Grad who received his B.S. degrees in mechanical engineering in 1937 and electrical engi-

neering in 1938 from the University of Louvain, Belgium, and then earned his master's at M.I.T. in '39 in mechanical engineering, is now serving as head of the electrical engineering section, Radio and Electrical Engineering Division of the National Research Council of Canada, in Ottawa. . . . **George A. Moore**, IV-A, is a member of the National Bureau of Standards Metallurgy Division, Gaithersburg, Md. **Irwin Weiss** has been promoted to staff engineer in charge of the vehicle safety program of the Chevrolet engineering department.—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

'40

From **Dave Sunstein** comes the following very welcome letter: "I thought you would be interested in news of one member of the Class of '40. Actually, it doesn't particularly apply to me, but it does to my children who have had a considerable interrelation with M.I.T. When I wrote to you earlier, our oldest son, Bruce, started at M.I.T. in math and physics. He graduated in 1965 with a B.S. in humanities and is now in his second year toward his Ph.D. in English at the University of Indiana. He is also teaching English composition to freshmen during the school term, but working summers in math and physics, last summer at G.E. in the manned orbiting laboratory program. Such diversity of studies could not have been achieved at Tech in our days. Our second son, Drew, is now a junior at M.I.T., taking electrical engineering. He is happily married to the former Bonnie Stone who is attending B.U. Our oldest daughter, Laura, just became engaged to Sydney Martin, M.I.T. '67, who is majoring in business management. Laura is now a sophomore at the University of Pennsylvania. The present generation of Tech men that these boys have brought around to the house are clear evidence that M.I.T. has made vast strides for the better from when you and I attended. (Nothing personal indicated.) Our three younger children are eager, but not yet in college. As for me, I have been continuing at General Atronics in the same post as when it started in 1955. A number of other M.I.T. men have joined the staff, including Millard Brenner, '39, Bernard Steinberg, '49 (who started the firm with me), Dick Spencer, '50, and Peter Gray, '61, all of whom were in Course VI, plus Andy Zeger, Class of '61 in Course VIII. That is not bad representation for M.I.T. in our staff of 250 people. General Atronics engages in diverse areas of signal processing as applied to nuclear explosion monitoring, radar, communications, target recognition, and we also manufacture high performance oscilloscopes and cathode ray tubes. A recent new product we introduced is code reading equipment to read codes printed on cartons, etc., flowing on conveyor lines, to enable interfacing of material movement with computers. The company's main headquarters are in suburban Philadelphia

with about 55,000 square feet, plus an offshoot laboratory in Arlington, Mass., and an auxiliary production facility in Reading, Pa. We are pleased to state that our first ten years of operation have permitted the growth from essentially less than a handful of people up to the present staff, with now approximately 1500 stockholders."

Bruce Duffett has been named manager of commercial development in the Marbon Chemical Division of Borg-Warner. He will be in charge of commercial development of new products. Previously he was director of marketing for Catalin Corporation, and before that he was with Union Carbide Corporation. . . . Ionics, Inc., of which **Russ Haden** is president, is in the news for improving wine with the aid of an ion exchange membrane. The same process is useful in concentrating fruit juices and flavoring. . . . **John Wuehrmann** has been elevated to the position of engineering associate at Esso Research and Engineering Company in recognition of his outstanding work in the area of project management. . . . **Sam Goldblith** is co-author of an article on the "Influence of Platen Temperatures and Relative Humidity During Storage on the Survival of Freeze-dried Salmonella Typhimurium." This subject matter is of relative importance in view of the recent problems with salmonella organisms in dried milk products. . . . It is with regret that I must report the death of **F. Leigh Noyes** on March 11, 1967. Leigh was a member of Course XVI and was employed by the Martin Company at the time of his death.—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, American Security Building, Washington, D.C. 20005

'41

Leona Zarsky and her husband graciously hosted an Eastern area Class '41 spring get-together on April 7 at their home in Brookline, Mass. Despite an unseasonable blizzard occurring on that day, it did not impair attendance and enjoyment of a fine social evening which included cocktails and a sumptuous buffet dinner. Those attending were Dr. and Mrs. **Henry Auerback** of Attleboro, **Everett R. Ackerson** of Braintree, Mr. and Mrs. **Edward Beaupre** of Newport, **Walter Kreske** of Newton, Mr. and Mrs. **Herbert D. Klein** of Swampscott, Mr. and Mrs. **Mitchell J. Marcus** of West Newton, Mr. and Mrs. **Edward R. Marden** of Weston, Dr. and Mrs. **Nathaniel Sage** of Lexington, Mr. and Mrs. **Irving Stein** of Arlington, Mr. and Mrs. **Frederic W. Watriss** of Concord, Mr. and Mrs. **D. Reid Weedon, Jr.** of Winchester, Mr. and Mrs. **Michael Driscoll** of Nantucket, Dr. and Mrs. **James W. Mar** of Lincoln and Mrs. **George Swift** of Waltham. . . . **Earl Meyers** and his Process Equipment Company of Brockton, Mass., were featured in the news recently as having passed the \$2 million-a-year mark in sales and expanding at a 20 per cent yearly rate. The company specializes in the design and fabrication of chemical processing equipment,

vacuum chambers and space environmental systems. Process Equipment Company grew out of Technology Engineering Company, Inc., which Earl founded in 1953 as a five-man machine shop. While they are separate companies, both are located on Forest Street in Brockton and now employ 175 people between them. . . . **Raymond W. Ketchledge** delivered the commencement address at graduation ceremonies of Illinois Institute of Technology at Grover M. Hermann Hall on the IIT campus in January. Ray is executive director of the new electronic switching division of Bell Telephone Laboratories, Indian Hill Laboratory, in Naperville, Ill. He is responsible for the development of new electronic switching systems for telephone service. His subject in the commencement address was "Organizing For Innovation." Ray is a native of Harrisburg, Pa., and joined Bell Laboratories in 1942. He is a Fellow of the Institute of Electrical and Electronics Engineers and a member of the scientific honor society Sigma Xi. He recently moved with his wife and six children to Wheaton, Ill. . . . **Frederick W. Watriss**, Assistant Treasurer of M.I.T., has been named a trustee and incorporator of the Charlestown Savings Bank. . . . **Harrie M. Quackenbos** presented a paper on weathering studies of polyolefins at a Symposium on the Weatherability of Plastics at the National Bureau of Standards site in Gaithersburg, Md., in February. The symposium was jointly sponsored by the Manufacturing Chemists' Association and the National Bureau of Standards. Harrie is associated with the Union Carbide Corporation's Bakelite Company. . . . **Irving Stein** has founded Cambridge Institute For Management Education, Inc., located at 2464 Massachusetts Avenue, Cambridge, Mass. Courses available include management of operations, marketing management, finance and managerial economics which are taught on a two-semester academic year basis. Semesters begin in September and January with demands on the student averaging six hours per week, all outside of his regular employment hours. The courses are built around the case method stimulated by group discussion in addition to a written case analysis which receives a personalized commentary by an appropriate staff instructor. Despite a relatively brief operating history, being started in 1965, Cambridge Institute already carries an impressive roster of 25 corporate clients who have enrolled managerial employees in courses of study. . . . **Kenneth G. McKay** has been promoted to the position of vice-president of engineering of Bell Telephone Laboratories. Kenneth received his Sc.D. degree from M.I.T. and served five years with the National Research Council in Canada before joining Bell Laboratories in 1946 where he engaged in research concerning the physics of solids. Subsequently he worked with the electrical and optical characteristics of electrical breakdown in germanium and silicon. For the past seven years he has been executive vice-president for systems engineering. He is a Fellow of the American Physical

Society and has served on the board of editors of the *Physical Review*.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; Assistant Secretaries: **Everett R. Ackerson**, 16 Vernon Street, South Braintree, Mass.; **Michael Driscoll**, 63 Centre Street, Nantucket, Mass.

'43

Hamilton Herman was elected president of the Industrial Divisions of Rockwell-Standard Corporation. Previously he was with American Machine & Foundry Company, New York, as vice-president for research and development and vice-president, commercial development. . . . **Joe M. Smith**, who received his doctor's degree in chemical engineering with our class, was a guest lecturer recently at Kansas State University participating in a special reaction engineering course. He is head of chemical engineering at Davis campus of the University of California and has been both a Fulbright Research Scholar and a Guggenheim Fellow. He is the author of many technical publications and of widely used textbooks. . . . **Ned Swanberg**, our Class Gift Chairman, has been extremely active in the American Platform Tennis Association, not only as its secretary-treasurer, but also as a participant in its national tournaments. After reading an article about the game and about Ned in *Time* magazine in March, I read in the New York *Times* sports section where he and his partner reached the quarter finals. Unfortunately I never heard the final results. . . . It is with extreme regret that I inform you that **Frank Mabbett** passed away on February 6, 1967. He was very active at M.I.T., having been chairman of Walker Memorial Committee, a member of Osiris, and active in the Institute Committee, the Architectural Society and on the crew. After receiving his degree in architecture, he served as a captain with the Army Corps of Engineers in three theaters of war. He headed his own architectural firm in Madison, Wis. He was a member of the American Institute of Architects, the Madison Art Association and Delta Upsilon fraternity. As a member of the Educational Council he expressed a keen interest in M.I.T. affairs and encouraged and inspired many young men from his area to attend M.I.T. . . . In March I attended an informal meeting in New York with other classmates interested in the 25th Reunion Gift Committee. Present were Ned Swanberg, **Chuck Lawson**, **Jim Spitz**, **Bernie Brindis** and **Charlie Hathaway**. **Jim Hoey** told me of a similar meeting in Boston. We are making good progress on our reunion gift, which is expected of our class.—**Richard M. Feingold**, Ritter & Berman, 266 Pearl Street, Hartford, Conn. 06103

'46

Our Class President, **Ted Heuchling**, has been appointed director of engineering for Arthur D. Little. Ted is now a vice-

president. . . . **New Bowman** finally left M.I.T. after having taught there 14 years as professor of industrial management. He is now comptroller of Yale University. . . . **John A. Gautraud**, formerly of Avco Space Systems Division, joined the United Aircraft Corporate Systems Center as an executive assistant to the division president. . . . The president of Minneapolis-Moline, Inc., has announced the appointment of **William S. Coleman** to the post of director of product engineering. He, his wife and three children reside at 6604 Naomi Drive, Edine, Minn. . . . **Lewis (Jim) Mann, Jr.**, has taken a leave of absence from his research job with the Veterans Administration Hospital in West Roxbury, Mass., and moved with his wife and three children to East Grinstead, Sussex, where he is studying at the biology research unit of the Queen Victoria Hospital. His first year ends this June, and Jim then plans to study in Denmark at the University of Copenhagen. . . . **Marion Hogan** of Boston is an industrial meteorologist and maintains an office near the Boston Public Library. Miss Hogan advises her clients (which include Logan Airport) by coded messages on teletype on weather conditions which could help or hinder their operations. . . . Army Colonel **James J. Larkin**, who served with the Combats Developments Command Institute of Special Studies (which is concerned with Army's future), was awarded the Legion of Merit for his leadership and imagination in actions which will have a beneficial influence on the Army of the future. . . . **Victor F. Bachmann de Mello**, a Brazilian Professor of Soil Mechanics at the University of Sao Paulo and the School of Engineering of Sao Carlos, has been appointed to the Department of Civil Engineering at M.I.T. for the academic year of 1966-67. He holds the National Science Foundation Senior Foreign Scientist Fellowship. . . . An article by **Fork Park**, the senior editor of *International Science & Technology*, entitled "The Printed Word" appeared in the January '67 issue. The article concerned the new demands that the printing industry is making on technology in order to facilitate change and promote greater flexibility. . . . **Donald E. Burke** has qualified for the title of Chartered Municipal Finance Consultant in Florida. He is with Goodbody & Company. His address is: 1818 Caesar Way, South, St. Petersburg 12, Fla. See you all on Alumni Day, June 12!—**Donald A. Hurter**, General Medical Industries, Inc., 533 Commonwealth Ave., Boston, Mass.

'49

John D. Alden is the author of a study titled: "Engineering Demand to Exceed Supply for Next Decade." John is executive secretary of the Engineering Manpower Commission of the Engineers Joint Council, 345 East 47th Street, New York, N.Y. 10017. His study shows that within 10 years the nation will be short 330,000 new college graduate engineers

where 830,000 will be needed. One chart shows that the projected growth of engineering employment between 1965 and 1976 will average 33 per cent with such fields as education, aerospace, construction, metals, chemicals, and electronics having substantially greater growth prospects than the average. At the other extreme, utilities and local governments are forecasting a small reduction in the need for new engineers. Among factors holding down the available supply are a declining popularity of engineering among new college freshmen, the lengthening of the average engineering curriculum from the traditional four years to five or more years, the increasing number of graduates who continue on to advanced degrees, and the loss of 10-15 per cent of engineering graduates who shift to other fields of employment. Copies of John's study can be obtained at the above address for \$4.00. . . .

Dick Lang is the author of a feature article in a recent issue of *Instruments and Control Systems* dealing with the processing of data in digital systems. Dick is a principal engineer in Raytheon Company's Wayland Laboratory, Wayland, Mass. He is the author of six other technical articles in the field of automatic control and is the holder of a dozen patents. Dick lives with his wife Betsy and three sons Jeffrey, 13, Timothy, 11, and Steven, 9, on Winter Street in Lincoln, Mass. . . .

Clyde M. Adams, Associate Professor of Metallurgy at M.I.T., is the subject of a feature article in *Metalworking News* for February 27, 1967. The article is headlined: "M.I.T. Research Proves Value of Brazing." In it Dr. Adams discusses the benefits of brazing (to avoid the brittleness common to many welds) and also details some of the problems and prospects associated with laser and electron beam welding techniques. Lasers have great potential but are currently handicapped by the short duration of the pulse and by the high reflectivity of metal.—**Fletcher Eaton**, Secretary, 42 Perry Drive, Needham, Mass. 02192

'50

Congratulations to **Earle DuBois** who has been appointed electric utility district manager for South Pacific district of Westinghouse Electric. . . . Professor **Fred McGarry** has been conducting experiments with lasers to weaken rock in tunneling research at M.I.T. . . . Look for the recent publication *Improved Procedure for Extracting Food Fatty Acids* authored by A. K. Lough, our **Juan M. Navia**, and R. S. Harris, published by M.I.T. . . . **Bill Boyd**, one time computer automation planner for the N.Y. Stock Exchange, is now heading up the New York Planning Research Corporation. Give Bill a buzz if you need information on computer programs for securities orders and transactions, cage operations and back-office accounting. . . . **Bart Jones** has been made honorary member of Instrument Society of America for his work in flow and pressure

Richard E. Lang, '49



measurement. He holds 17 patents in these fields. Barton Instrument Corporation is a unit of IT&T Corporation and is headquartered in Monterey Park, Calif. . . . Here's a little inside info—no change in **Fred Adams'** status or address. . . . **Bill Bakemeyer** is now assistant lab manager at Space Systems Division of Hughes Aircraft. . . . **Norton Belknap** and family arrived in Australia March 1 after his two-month trip around the world. He is now managing director of Esso Standard Oil of Australia Ltd. and will also become chairman of the board. Nort reports that life is quite different in contrast with the glamour of Japan, but that they are quite happily settled. Their house overlooks Sydney harbour, and their 23 foot sloop is anchored 10 minutes away. They haven't readjusted to skiing in August and a "shirtsleeve" Christmas. On the business side, Esso has made a major discovery of natural gas and crude oil and coping with marketing problems. . . . **Jake Ferguson**, through an absence of ulcers, may still enjoy martinis and good health. He and the Ferguson clan spent two weeks in Canada portaging canoes. . . . **Gordy Holme** and Eleanor spent their vacation in the New York-New Jersey area. During April Gordy traveled on business to Japan, Hong Kong and Bangkok. . . . Look for **Bob Kovacs** to pop up just about anywhere now. Bob now has his own Cessna 205 (a six passenger single-engine) and is currently working on his instrument rating. He flew the family to the Bahamas in July for 10 days. Drop him a note if you too are a pilot. Bob was in Cleveland not too long ago, so he is getting around. . . . **Dick Meyer** is now manager of production control and assembly in a recent reorganization of GE's Flight Propulsion Division. . . . **Ted Metzger** took his family vacationing in New York State. The visit included a trip to Thousand Islands and Ottawa. They recently purchased a tent and plan several outings this year.

Anyone missing **Ray Moeller** can locate him in Mogadore, Ohio, where Ray is still vice-president of Cornwell Quality Tools. By the by, Mogadore is a suburb of Akron. Or is it vice-versa, Ray? . . . **Milt Rand** spent a week cruising aboard the USS *Bennington* as part of his duties as project strength engineer for McDonnell Company. He later saw **Bill Bakemeyer** in L.A. . . . **Bud Simpson** moved to Scotland last June for a two-year assignment as director of Trane Subsidiary in the U.K. Bud's mailing address is still LaCrosse, but he may also be contacted at 28 Bramble Drive, Edinburgh, Scotland, if you happen to be there on vacation. They have already explored a lot of

Scotland, London, Paris, Copenhagen and France, so drop him a line first. . . . **Don Starnier** is now associated with Associated Construction and Engineering Company of South San Francisco. Don and Mary play third row clarinets in the Palo Alto community band. . . . Our hat is off to **Don Walker** who has become a new father by adopting a 12-year-old Hong Kong boy under the Foster Parents Plan. Don is now director of the Mark 17 Minuteman Program. AVCO won this contract. Don is still very active as chairman of the Reading School Committee, but he highly recommends the Foster Parents Plan, and I, being the father of two sons, would agree that raising sons is highly rewarding (daughters, too!). . . . The recipient of the Robert A. Millikan Lecture Award was none other than **John G. King**, Professor of Physics at M.I.T. The award is made possible through the annual support of Prentice-Hall, Inc., for creative and imaginative contributions to the teaching of physics. Congratulations, John! . . . More along the lone line of publications from the Class of '50—"Metal Cutting Lubrication Through Continuous Electroplating" by **N. H. Cook**, Professor of Mechanical Engineering at M.I.T. The paper was presented at the 21st ASLE Annual Meeting held in May, 1966, in Pittsburgh and published by the *Journal of American Society of Lubrication Engineers*. . . . **Osmund Fundingsland** tells us (via Boston Globe) that EG&G's Santa Barbara operation is "heady stuff." Actually, geographic engineering is a term heard often at EG&G's division which emphasizes controlled nuclear explosions for the betterment of mankind. More of an immediate possibility is that of exploding devices below ground to get at previously untappable natural gas and oil. A joint project of the Atomic Energy Commission and a Southwestern utility will attempt to turn theory into practice later by blasting for gas the nuclear way. The business that "OT" and his men are developing represents a \$4.5 million chunk of the Mass. based company's annual business. . . . **Wally Attridge** has been named head of tactical systems with

Lawrence A. Harris, '50, is at the Electronic Physics Laboratory of General Electric's Research and Development Center, Schenectady, N.Y. He recently was co-author of "Biopotential Cathodes for Reduction of Grid Current" in *IEEE Transactions of the Electron Devices Group*.



MITRE's Washington operations. Wally was previously assistant to associate technical director and has been with MITRE since 1959. . . . Well fellows, one of our boys, **Wendell Sykes**, has published again. The publication entitled *Hazards of Potentially Explosive Materials* is being published by Arthur D. Little, Inc. Wendell has recently been working in the field of ASW systems engineering. His interests lie in the general field of explosives, industrial hazard evaluation, electronics and meteorology. That's all for now, boys. Keep the news items coming! Best to you all.—**Gabe Stilian**, Secretary, 4 Biscayne Drive, Huntington, L.I., N.Y.

'51

I have had the occasion to either visit with or merely be in the same vicinity as a number of classmates, and this aids, in no small way, news-gathering. **Ed Bronstien** is vice-president of the United States Bedding Company in St. Paul. He and Elsa (Shapiro) have three children: Jane, 12, Linda, 10, and James, 6. . . . **Gerald Burns** is still with G.E., Evan-dale, and as we reported in a prior issue, is living a full life: politics, United Appeal, church and Chamber of Commerce. He and Betty extend an invitation to classmates to visit when in the vicinity of Cincinnati. . . . **George Butzow** shows up regularly at the Metals Show. He is now vice-president of MTS Systems Corporation, Minneapolis. George had served in various capacities, including vice-president, with Research, Inc., of which MIT had been a division until it was spun off in October, 1966. The Butzow gang includes Gretchen, 12, Chris, 11, Dana, 8, Martin, 6, Jill, 4, and of course George's lovely wife, Pat. . . . **Al Boltax** is manager of fuel development

on the Nuclear Rocket Program (NERVA) at Westinghouse Astro-Nuclear Corporation in Pittsburgh. Al and Barbara have three little ones: Jay, 8, Leslie, 7, Nancy, 4. Spare time activities include tennis and 'cello. . . . **Joseph Iannicelli** was recently promoted to research manager of the J. M. Huber Clay Division near Macon, Ga. Prior to this Joe had been with DuPont Textile Fibers Department whom he joined after receiving his Ph.D. from Tech. His current interests include a research program on kaolin clays (which are responsible for the slick finish on our magazine covers). Joe is an educational counselor for M.I.T. in the Macon area. The Iannicellis number two boys and a brand new (January) baby girl. . . . **Bill Lucas** recently moved into the New York area from Texas. He has joined W. R. Grace & Company as manager of engineering, technical group. He and Mary have two boys. . . . Under the heading "Micro-electronics Story: 'Let's Go'" is an article about **William MacDonald**. The article, about a rise from chief engineer to president, tells how Bill and a few associates bought out a Xerox subsidiary which has been renamed Film Microelectronics and have parlayed this into an operation unique in the microcircuitry field. Bill and Barbara are living in Littleton, Mass., and have five children ranging in ages from 6 to 13. The distribution is three girls, two boys. . . . **G. W. "Bill" Meckert** is living in Huntingdon Valley, Pa. He and Marion have five from 2 to 14 with a three to two distribution opposite to that of the MacDonalds. Bill is township commissioner, president of Savings and Loan Association, chairman of the Boys Club Camp, and president of Geo. W. Meckert, Inc. . . . I am not always surprised at the distribution of occupations among classmates, but the number of '51ers who have made the armed serv-

ice their careers is quite large. A selection: **Homer Adrianse**, Capt. USN, lives in Bremerton, Wash., is design superintendent at the Puget Sound Naval Shipyard, and with Suzanne has three grown children (ages 16, 17, and 19). . . . Capt. **Herbert Ainsworth** (recently promoted from commander) is commanding officer of the USS *Mathews* (AKA-96). He and Anne have four children, 7, 12, 16 and 18. . . . Lt. Col. **H. L. Cummings** is at Satellite Beach, Fla. His oldest boy Bill entered Williams College this year. . . . **Austin Hubbard**, Capt. USCG, is officer in charge, Coast Guard Marine Inspection, Port Arthur, Tex. . . . **Clayton Jensen** swapped his lt. col. rank to become plain Dr. Jensen. Clayton got his Ph.D. at M.I.T. in 1960 in meteorology. He is now chief, supporting research group, office of the Federal Coordinator for Meteorological Services, Washington, D.C. Clayton and Giselle have three boys, 8, 13, and 14. . . . And Capt. **Van Dyke Johnson** is stationed in Honolulu with the Navy. He and Margaret have a daughter, April aged 11.

A note left on my desk tells of the M.I.T. Club of Washington's seminar on New Concepts in Management this past February. On the committee were a number of '51ers including, of course, **Gil Davis**, President of that Club (and recipient of a bronze beaver award in behalf of the club's activities), **Paul Havenstein**, **Breen Kerr** (Deputy Chairman), **Daniel Maxfield**, and even the father of a '51er Thomas Meloy, '17, Honorary Deputy Chairman whose son, **Thomas P. Meloy** has just moved from Milwaukee to Reston, Va. . . . After all of my beefing I got a real chatty note from **Fred Radcliffe**. In fact it is so chatty, and I beefed so much, that I'm not sure how I can either get it all into the news or edit it without having to apologize to Fred. Well, it all started with a news release from the Town of Clinton, Conn., where Fred was named town engineer. He also holds this post in the neighboring towns of Essex and Old Lyme. Fred is a rather active politician. In addition to having served as a selectman in Essex, chairman of the Citizens Advisory Group for High School Athletic Fields (He became the design engineer for construction of a new athletic field and the school awarded him a varsity letter!), he is a consultant to the Planning and Zoning Commissions in the above towns. In his spare time Fred is president of F. A. Radcliffe, consulting civil engineers, which he started in 1958. He and Jeanne have two children, Kathryn 13, Fred, Jr., 11, and that about wraps it up except for the fact that he is also president of the local Little League. . . . A long overdue answer to **Paul Rothery** who is living in Suffield, Conn., with Janice (McGuire) and their contribution to the population explosion, Jill 12, John 4. The Rotherys are an athletic family, skiing, swimming, camping and a recent 7-day sailing cruise along the Southern New England Coast. To support all of this, Paul and his brother manage the Bay State Refining Company in Chicopee Falls, Mass. Prior to this venture into self-employment, Paul had spent nine

Two M.I.T. alumni—James P. Van Etten, '50 (second from the left), and Claude J. Pasquier, '50 (right), have shared a \$10,000 prize from their employer, ITT Federal Laboratories, for development of Loran-C air navigation equipment. With them in the picture, made during the first presentation under an Awards Program established in 1966, are Henri Busignies (left), General Technical Director of ITT, and Harold S. Geneen, President and Chairman of ITT's parent company, International Telephone and Telegraph Corporation.



years with Hamilton Standard Division of United Aircraft. Thanks for the nice letter Paul; I hope that more of our classmates take the cue. . . . **Arthur Schein** is a partner in the firm of Sumner Schein, architects and engineers, in the Greater Boston, Mass., environs. The Scheins, Kelly, Arthur, and daughter Jo, 11, live in Newton, Mass. . . . **Bill Shenkle** was home long enough to attend the reunion and add that Betts and he have three children. They're living in Pittsburgh, and he is a systems analyst with Rockwell Mfg. . . . After announcing that **Hal Siegel** was one classmate who in 15 years still worked for the same firm that he joined on graduation, you guessed it. I got a letter from him telling me otherwise. We had a chance to chat in the D.C. Airport recently, but I lost all of my notes. At any rate Hal has switched over into the legal side of business and has a private law practice also. Connie is still illustrating and was with Lockheed Shipbuilding Corporation, but I am afraid that these notes are now passé. . . . A picture of **Hank Spaulding**, President of Spaulding and Slye (real estate developers), appeared in a local publication. Hank had his hands on a shovel breaking ground for a new 14 story office building for Central Square Cambridge which his firm is developing. . . . **Lou Stern** is now living in Summit, N.J., after being transferred from the West Coast to the New York office of Dames and Moore. The Sterns have three boys including twins, David and Michael 9, and Jonathan 5. . . . **David Grossman**, according to a release from Mayor John Lindsay's office in City Hall, New York City, is the new assistant budget director for the City of New York. Mayor Lindsay said, "David Grossman has achieved a distinguished career in planning and management. He has a reputation [for] innovation . . . He is eminently qualified and we are lucky to have him." David has been a private planning consultant and has been very active in urban redevelopment. The Grossmans have two children and are living in Forest Hills. . . . **Richard Hodgson** was made a vice-president of B. M. Holt Engineering firm in Pasadena (they are consultants to the petroleum industry). . . . **Abraham Nizel** is an assistant clinical professor, Tufts U. School of Dental Medicine, and is a Research Association at M.I.T. He authored an article on "Nutrients Foods and Oral Problems" which appeared in the *Southern Medical Bulletin*. . . . **John Singer** is research supervisor of Holland-Suco Color Company, Holland, Mich.—**Howard L. Livingston**, Secretary, 358 Emerson Road, Lexington, Mass. 02173; Assistant Secretaries: **Micky Alper**, 1130 Coronet Ave., Pasadena, Calif. 91107; **Walt Davis**, 346 Forest Ave., Brockton, Mass., and **Paul Smith**, 11 Old Farm Road, N. Caldwell, N.J. 07007

'52

Within the week a solid representation of the class will be in attendance at our 15th. If you haven't made the decision and find

it possible to attend, even for a meal, do. You'll find it worthwhile. Telephone **Doug Haven**, Reunion Chairman, collect on 617-864-1256 so that he can make arrangements with the Wychmere Harbor Club (formerly Snow Inn) on the Cape. . . . Now for some news of my own. Since I've found travel to be a major avocation in my life, I finally decided to get into the travel business and in May opened a branch of Peter Grimes International Travel of Concord and Lexington in Weston, Mass., right in the center of town on Boston Post Road. So far it has been an exciting and fascinating experience moving to the other side of the travel desk and looks like a rewarding change. Any of you in the Weston, Wayland, Wellesley area who would like to drop in and see the premises will be most welcome. . . . **Charles Allen "Al" Kandel** and Fran have moved out to West Los Angeles, Calif., where Al is with TRW Systems Management Proposal Electronic Hardware Operations in Redondo Beach. . . . **Kenneth C. Deemer** has been appointed by the United Nations Educational Scientific and Cultural Organization as director of a program to establish a training center for graduate engineers and professors of engineering science and technology to be located at the National Polytechnical Institute in Mexico City, Mexico. . . . Dr. Deemer was formerly chairman of the department of mechanics and aerospace at the University of Kansas. . . . Very short this month since there should be some good up-to-date news to gather at the Reunion. Until then, best regards.—**Dana M. Ferguson**, Secretary, Box 233, Acton, Mass.

'53

Received a welcome letter from our president, **Marty Wohl**, which reminds us that it is not premature to begin casting about for potential candidates to fill our various class officer slots. Any classmate who would like to make a recommendation in behalf of someone else or who may wish to become a candidate himself, should contact Marty at the RAND Corporation, 1700 Main St., Santa Monica, Calif. 90406. All nominations and their source will be held in strict confidence. As you know, Marty has been an acting associate professor at University of California at Berkeley and up until December of last year had a very attractive fellowship. As of July 1 he will join the RAND Corporation at the above address. His second book, *Traffic System Analysis for Engineers and Planners*, will be released by McGraw Hill this summer. In addition Marty reports: "Paul Shepard is doing a magnificent job as president of the Northern California M.I.T. Club, and to all appearances he and Ginny are enjoying the West Coast. Ann and **Bill Gilbert** live close to us, and we get together with them from time to time. Bill is successfully engaged in soil mechanics consulting practice, and he and Ann have just finished major renovations to their home." . . . **Benjamin P. Coe**, X, reported on "How to Help World Development without

Leaving Home" in an issue of *Chemical Engineering*. Ben is executive director of VITA (Volunteers for International Technical Assistants, Inc.). This fascinating organization aims at tapping at technical resourcefulness of engineers and scientists to solve the relatively simple need problems of persons in underdeveloped countries. An interesting result of one project was the development of relatively inexpensive (\$3 each) solar cookers which are being successfully employed by families without sources of fuel for cooking. Any of our classmates who may wish to learn more of this activity, should contact Ben in care of VITA, 230 State Street, Schenectady, N.Y. 12305. . . . **John G. Polk**, X, has been appointed manager of manufacturing services for MNT Chemical, Inc., in Rahway, N.J. John joined the firm in 1956 as a project engineer. . . . **D. R. Andelin**, VIII, is section chief, communication and telemetry, advanced space station and planetary system department at Douglas Aircraft Company at Huntington Beach, Calif. He has been engaged in telemetering at Douglas since 1953 and is on the board of directors of the International Foundation for Telemetering. . . . **Dr. J. H. Hansen**, V, has been promoted to senior research chemist at Dow Badische Company in Williamsburg, Va. He is conducting research in the field of acrylic fiber spinning technology. John received his Ph.D. in organic chemistry from Iowa State University. The Hansen's have three children, and they reside at 21 Warren Drive, Newport News, R.I.

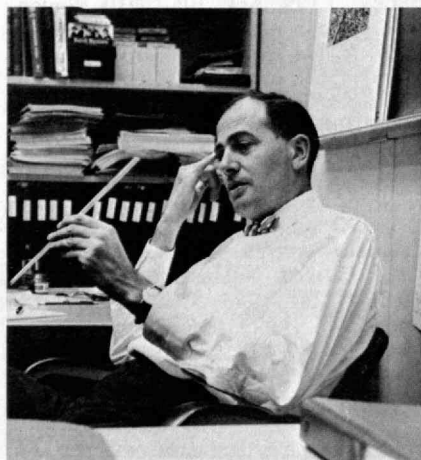
We would like to remind you once again to offer any suggestions for our 15th Reunion and to wish you a pleasant summer. The following are address changes: **Frank A. Ramisch**, IV, 647 Eastwood Way, Mill Valley, Calif. 94941; **Everett W. Hobart, Jr.**, V, 529 Lynn St., Ridgewood, N.J. 07450; **Carl F. W. Wolf**, X, 676 6th Ave., New Hyde Park, N.Y. 11040; **Joseph J. Wysocki**, VI, Village Road, East Dutch Neck, Princeton, N.J. 08550; **George J. Fuld**, IX, 6701 Park Heights Avenue, Baltimore, Md. 21215; **Antonio S. D. Neves**, XII, C.O. 2008, Lourenço Marques, Portuguese East Africa; **Chadwick B. Gibbons**, XV, 10 Madison Avenue, Pleasantville, N.Y. 10570; **James A. Hurst**, II, Woodchuck Hill Road, Harvard, Mass. 01451; **George R. Thompson**, Jr., IX, 3340 Reservoir Rd., N.W., Washington, D.C. 20007; **Gene T. McCoy**, XVII, Apt. 105, 5710 Winton Road, Cincinnati, Ohio 45232; **Robert J. Hinds**, X, 122 Crest View Drive, Orinda, Calif. 94563; **Frank C. Hartzell, Jr.**, I, 220 Beech Hill Road, Wynnwood, Pa. 19096; **Robert W. Ebeling, Jr.**, X, P.O. Box 28, Maxatawny, Pa. 19538; **John F. Becker**, XV, Becker Research Corporation, 44 Bromfield St., Boston, Mass. 02108; **Robert Kay**, VIII, 2701 No. Mountain Avenue, Claremont, Calif. 91711; **Peter B. Noonan**, Booz, Allen & Hamilton Inc., 380 Madison Avenue, New York, N.Y. 10017; **Lawrence N. Odene**, III, 301 Evergreen Drive, Moorestown, N.J. 08057; **Bennett Sack**, XIV, Crucible Steel Company, P.O. Box 977, Syracuse, N.Y. 13201; **S. Robert Wolf**, I, Joseph E. Bennett Company, 214

Garden Street, Needham, Mass. 02192.—**Norman R. Gardner**, Secretary, 100 Memorial Drive, Cambridge, Mass.

'54

Arthur Kaplan was honored at the March meeting of the Alumni Council for his efforts as Alumni Fund regional solicitor for the Framingham area. Art now works at Tech Ops in Burlington and will return to M.I.T. in the fall to pursue his doctorate. . . . **Dan Lister** is in nuclear physics research at the Argonne National Laboratory and has recently moved with wife Bobette and children, Jennifer, 3, and Julie, 1, to Park Forest, Ill. . . . **Sam Losh** passed on this item: "One of the remaining bachelors bit the dust. **Reed Margulis** married Aliza Chapsky in Los Angeles on March 19 and left for three weeks in the Caribbean. They will live in Berkeley (41 Highland St., Berkeley, Calif.) where Reed is going into the chemical business dealing in chemicals for the semi-conductor industry." Sam typed his note with daughter Elizabeth, 17 months, on his shoulder. Nice going, Sam. You type better with handicaps than I do without. . . . **Ian Williams** is living in Australia and reports that he enjoys his change of profession from engineer to rancher very much. Ian has been contending with a severe drought which made water expensive, but he notes that beer is still available. How about trying the cattle on that? . . . **Bob Blakeslee** has recently returned to the U.S. from Australia, but no other information is available except that he now lives in Albany, N.Y. His previously reported address was in Canada. . . . **Ezra D. Ehrenkrantz**, a partner in the architectural firm of Leefe and Ehrenkrantz, is also president of Building Systems Development, Inc., and associate professor at the University of California in Berkeley. He reports that his hobby is sleep, a well-earned rest it sounds like. . . . **John**

Richard J. Charles, '54, recently published an article, "The Mixed Alkali Effect in Glasses," in the *Journal of the American Ceramic Society*. He is in the Metallurgy and Ceramics Laboratory of General Electric's Research and Development Center, Schenectady, N.Y.



Giancola is assistant chief of the Solid Rocket Division at the Air Force Propulsion Laboratory at Edwards where he has recently moved with wife Lillian, Peter 9, Anthony 6, and Ann Marie 4. . . . **K. M. Zwilsky** is head of the Alloy Development Branch, U.S. Marine Engineering Laboratory. . . . A recent speaker at the Junior Engineering Technical Society in Springfield, Mass., was **Anthony Romano** who discussed the Bay State West Commercial Development of which he is president. . . . **Kenneth Ralston** resides in Concord, Mass., with wife Dorothy, children, Virginia, William and Ann. Ken is on the staff of M.I.T.'s Lincoln Laboratory. . . . **George Sebestyen** joined the office of the Secretary of Defense where he is in the office of the Director of Defense Research and Engineering. He had been technical director of the Information Sciences Laboratory, Litton Industries, in Waltham, Mass., where he worked on the application of pattern recognition to speech signal processing and pictorial information handling. He also worked on the development of sonar signal and acoustic information processing techniques. . . . **Harold Olsen**, wife Virginia, and Nina 4½, and Karl 2 have recently moved to Menlo Park, Calif. Dr. Olsen is responsible for organizing a research group in soil engineering at the U.S. Geological Survey, Branch of Engineering Geology. This group is aimed at bridging the gap between geology and engineering practice. . . . **Nicholas Saber** is at Sylvania's Applied Research Laboratory where he is engaged in making effectiveness analyses for strategic offensive and defensive forces. . . . **Charlie Masison**, our Class President, recently left Sylvania to take over as technical director at Auerbach Corporation's newly created Boston office. . . . An open invitation is extended to all classmates in or passing through Japan by **Scott Mudgett** and family (Barbara Ann and children, Victoria 7, Felicity 6, and John, 2nd, 4,—all future Tech "men"). "I'll take royal care of them," promises Scott, who is now a major and assigned to U. S. Army Headquarters at Camp Zama (35 miles SW of Tokyo) for the next two-and-a-half years. Just call Camp Zama 3-1818. Scott, a regular officer in the Chemical Corps, is USARJ chemical staff officer there. . . . **Terri** and **Jack Duffin** announce the arrival of their fourth child, a baby girl, Stacey Joan, on March 24.—**E. David Howes, Jr.**, Acting Secretary, Box 66, Carlisle, Mass. 01741

'55

Only the significance of the following announcements is able to offset the insignificant amount of space that this column occupies. Your editors are able to print only the information that we receive from you, and by this late date in the season we have already said as much about ourselves and our local classmates as it is reasonable to expect you to read. How about a few notes of cheer, with pictures. . . . **Samuel C. Goldman** was

married to Mary-Glenn Yeary of Newkirk, Oklahoma, and Cambridge, Mass., in April. At the wedding were classmates, **Art Solomon**, **Bob Posner**, **Larry Berman** and **Dennis Shapiro** and spice (spouses?). The reception was held at the home of Dick Mateles, '56. After a Puerto Rico honeymoon they settled in Cambridge. Sandy has long been one of the more well-known holdouts to bachelorhood among our classmates. We are sure that he will survive this transient and convey best wishes to the happy couple. Sandy is in charge of numerous space research programs at Di/An Controls in Boston. . . . **John Buchanan Brown, Jr.**, was born in March to Anne and **Jack Brown** of Lincoln, Mass. Jack is with the Medinet Division of General Electric in Watertown, and is currently working on problems concerned with the application of computers to hospital administration and internal control. We had the pleasure of holding Jack's hand and going through a bottle of Scotch the night before. Our impression was that the father had the toughest time of anybody else concerned. As it turned out, the only item that turned out worse for the wear was the bottle of Scotch (Hic).—Secretaries: **L. Dennis Shapiro**, Aerospace Research, Inc., 130 Lincoln Street, Boston, Mass. 02135; **Dell Lanier Venarde** (Mrs. J. H.) 16 South Trail, Wilmington, Del. 19803

'56

Guy Spencer continues to bring back news of active classmates from his official Alumni Office travels. In Los Angeles classmates are really pitching in when it comes to alumni affairs. Listed in the recently published directory of alumni officers are **Martin Chetron**, serving as 1st vice-president of the Los Angeles Club as well as helping out on the Educational Council. Also on the Council are **William Whitney** in Pasadena and **David Mitchell** in Torrance. Regional Chairmen for the Alumni Fund include **Ed Zoolalian** living in Monrovia where he works for Space-labs. Ed met his wife, a travel agent, while he was traveling in Japan (wouldn't sign up for ROTC, huh?) and they have enjoyed some exciting trips since then. Their interests are now centered on a 10-month-old son, and Ed is already planning for a girl. **Richard Clapp** is the chairman in Van Nuys and Glendale. He is one of our remaining eligible bachelors, working as a senior research engineer at Rocketdyne. Richard has also enjoyed some foreign travel, having spent several weeks in France during 1964 in connection with an automated machine tool project. Adding to our list of active classmates, **Charles Green** is the Fund Chairman for Santa Barbara, and **Fred Culick** is helping out as a solicitor in Pasadena where he is associated professor at Cal Tech (it's a school, there). That makes seven . . . any other classes care to challenge us? . . . **Walt Frey's** class luncheon in New York on February 23 brought out 11 classmates. Another was held on April 20 (while this was being printed) and future dates are July 20 and September 21. Con-

tact Walt at Pan American. . . . **Lloyd Beckett**, our prosperous Treasurer, started work for Polaroid Corporation on April 1 in quality control. . . . **Chuck Benjamin** worked for Tech's Lincoln Labs until 1961 designing classified electronic gear. Then he moved to Space Technology Labs and the Space Science Center at UCLA. Since 1964 Chuck has been technical director of the Marshall Laboratories in Torrance, Calif. . . . **Don Brusch** writes that he is coordinator of engineering services for the F & M Division (Chemical Instrumentation) of Hewlett Packard in Avondale, Pa. Don has previously worked for Raytheon and Fenwal. Don and Gail have three children. In his spare time Don is working on a second masters degree—this time its operations research. . . . **Marty Chetron**, in addition to being the 1st vice-president of the Los Angeles M.I.T. Club, works for NASA as the West Coast representative for the Marshall SFC in Huntsville. Marty has an MBA from USC and is involved in personal investment planning with Mutual Fund Associates of Los Angeles. By the way, he also has a family including two daughters. . . . **Ron Clark** has moved back to Boston to be assistant vice-president and a security analyst for Putnam Management Company, Inc. . . . Judith and **Elhanan Ronat** have written from Rehovoth, Israel. Judith is working as a psychiatrist at the K. H. Mental Health Clinic, and Ed is a physicist at the Weismann Institute of Science. Their childrens' names are Naomi Raquel and Ethan William. . . . **Frank Zenie** has been appointed a staff assistant to the general manager of the Neponset Plant of the Foxboro Company in Foxboro, Mass. Frank has been with Foxboro since leaving the army in 1957. He lives in Attleboro and is working on his masters in business at the University of Rhode Island. . . . In the April Review (page 85) appeared the word "extar" which you won't find in Webster—not yet anyway. If and when you do, and it's a good chance you will, credit classmate **Oscar Manley**. The word is, as you may guess, a contraction of "X-Ray Star" and was invented with the help of a second or third martini in Boston's Chinatown. Oscar joined American Science and Engineering of Cambridge before completion of his doctorate, received from M.I.T. in 1960, and has remained there since, rising to project director. As such he is engaged in the theoretical aspects of x-ray astronomy. At home in Lexington Oscar assists wife Betty in tracking three additional stars, Martin 7, Evelyn 4, and Joe 1.—Co-Secretaries: **Bruce B. Bredehoff**, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, M.I.T., Room E19-439, Cambridge, Mass. 02139

'57

This column should reach most of you just before the Reunion weekend, a little more than two months from today. I had hoped to get back to see everyone, but now it doesn't seem possible. As I write, I'm over the Atlantic on my way to the

Francis H. Zenie,
'56



States for a short, unanticipated visit to my hometown. Making another trip in June would lead to personal balance-of-payments problems. Now for the news. The *Boston Globe* recently expanded on the activities of **Ray Stata** as follows: "How's this for progress? Matt Lorber [56] and Ray Stata have founded and sold one business and built another up to a \$3 million sales pace in two years. Lorber is president, and Stata vice-president of Analog Devices, Inc., Cambridge. They used money from the sale of their first company, Solid State Instrument Corporation, as the stake for Analog. Former roommates at M.I.T., they both admit that their company's growth has been somewhat faster than expected. Analog's product is analog devices. More specifically, the devices are operational amplifiers of packaged circuits which are sold as building blocks to makers of electronic equipment. Biggest customers are aerospace-military users and the control, servo and process industries." . . . Each month I receive one clipping or more from the Review office concerning another very successful classmate, **Ed Roberts**. To keep you up to date on his activities, here are extracts from a sketch of him recently published in *IEEE Transactions on Engineering Management*: "He received the S.B. and S.M. degrees in electrical engineering in 1958, the S.M. degree in industrial management in 1960, and the Ph.D. degree in economics in 1962, all from M.I.T. Since 1958 he has been on the staff of the M.I.T. Sloan School of Management where he is now associate professor of management and associate director of the M.I.T. research program on the management of science and technology. He has been a consultant to NASA, the RAND Corporation, IBM System Research Institute and a number of electronics and aerospace companies, and is on the board of directors of Tyco Laboratories, Inc. In 1963 he co-founded and became president of Pugh-Roberts Associates, Inc., a consulting firm specializing in industrial dynamics and research and development management. He is director of operations of the College of Research and Development (COLRAD) of the Institute of Management Sciences, an associate editor of *Management Science*, and a member of the editorial board of the forthcoming *Journal of Research and Development Management*. In addition he is the author of a book and many articles on industrial dynamics, management control systems, R&D management, and organizational studies."

The Worcester, Mass., *Gazette* had a long article in February on some work being done by **Charles Feldman**. The article read in part as follows: "Worcester

will cross the threshold of the 'checkless society' in three to five years and then proceed toward the 'cashless society,' a Worcester Polytechnic Institute professor predicted today. Dr. Charles F. Feldman, assistant professor of mechanical engineering, is currently conducting a two-year, \$11,000 survey of a new system to reduce work and cost involved in financial interchange in the Worcester area. The project is sponsored by Worcester County National Bank. Feldman says in the cashless society 'funds are directly transferred from one person or company to another without the intermediary of cash or checks.' According to latest surveys, Feldman went on, the new system would save about five cents on every check transaction or \$500 million annually. The basic mechanism is there and technologically the system could be put into operation tomorrow. It consists of a central computer connected to several terminals to be located at stores. As the cashless society progresses, such terminals may be placed into homes and offices as well. 'Some day you may pay your bills sitting in your kitchen through the system.' . . . **John Psarouthakis** has been named assistant director of research, Allis-Chalmers, in charge of the physics and materials sciences section. Before joining Allis-Chalmers John worked for Thermo Electron Engineering Corporation, Waltham, where he was a technical manager of isotope thermionic energy conversion. Since 1962 he was associated with the Martin Company, Baltimore, where he directed research and development in thermionic energy conversion systems and research in surface and plasma physics. John studied mechanical engineering at M.I.T. receiving his master's degree in 1962. He continued his studies at the University of Maryland, College Park, receiving his doctorate in 1965. His professional memberships include the American Institute of Aeronautics and Astronautics, the American Society of Mechanical Engineers and the Maryland Academy of Science. John received the Distinguished Young Scientist award of 1965 from the Maryland Academy of Science and the Martin honors award in 1964 and 1965 for outstanding contributions to science and technology. He is the author of more than 30 articles published on thermionics, thermodynamics, plasma physics, heat transfer and vacuum technology. He is married and has two children. . . . When I was down in Greece on business a few weeks ago, I looked up Valerie and **Bob Murphy** who have been living there for 18 months or so. Bob is with Esso and works on supply and distribution planning. Bob is quite accomplished in Greek; Valerie learned sufficient Greek to do her shopping and is now taking French lessons. Bob is still taking regular instruction in Chinese which he began three years ago in New York. On top of all this both are now taking lessons on the guitar. One of Bob's big problems in Greece is the driving. He regularly has fender crunching accidents and on one day the week before I arrived, had a total of three accidents. The Murphys have two children. . . . Well, that's all for now. Best wishes for a



Wayne Mock, '59

wonderful reunion. One reminder: if any of you will be in London during the summer, please look me up.—**Frederick L. Morefield**, 18 Whaddon House, William Mews, London SW1, England

'58

This month we are very pleased to have a lot of news to report on from classmates we have not heard from for awhile. A note from **Bright Lowry** tells us: "I received my Ph.D. at the University of Chicago in 1963. Following that I spent one year at Dartmouth (Rah!) and two years at the University of North Carolina (Raayah!) post-docing. Judy and I were married in September 1965 and are now in Dallas. Am an assistant professor here at SMU trying to teach the boys some chemistry." . . . **Thomas Shuk** is a partner and chief engineer, geotechnical department, with Geocolombia in Bogota, Colombia. He and his wife, Ines Elvira, have two boys, Esteban Alfredo 2½, and Juan Pablo 1½. . . . In Phoenix **George Schade** is now an M.D. in obstetrics and gynecology. When he has time, George relaxes with his ham radio, W7CWQ just in case you would like to get in touch. Janice and George have two children, Jim 4 and Ann 2. . . . **Charles Moo** and his wife Susan now have a newly arrived daughter, Lauren, 4 months. He is a staff scientist with Avco at the Research and Technical Laboratories in Wilmington, Mass. . . . Sharron and **Max Goldstein** are living in Reseda, Calif., where Max is a thermodynamicist with the aerospace industry. Their two children are Avery 6 and Kimberly 9 months. . . . Another ham radio fiend is **Emanuel Landsman** in nearby Lexington, Mass. He is working at the Lincoln Lab in space communications. He and his wife Sheila are enjoying the suburban living there. . . . **James Galbraith** is a senior scientist with Geoscience, Inc., in Cambridge, Mass., engaged in exploration geophysics research. He and Joan have a girl, Jennifer, 3. . . . **Johan Synnestvedt** is doing mathematical analysis and computer programming for Analytical Mechanics Associates. Johan and Inga are leading an active life in Cambridge with activities including Chorus Pro Musica, AIAA and SIAM professional societies, cabinet making, trombone, and hiking and skiing (whew!). . . . **Arthur Lewis** is in the aerospace field with NASA. He and Lois have a boy, Gregory, age 5. . . . Carol and **Willy Sander** are living in Stamford, Conn., and are the parents of a boy, Mark Frederick, now 2 years old. Willy is a project engineer for CBS Laboratories in Stamford.

. . . **Jack Freer** is a patent attorney with Diamond Alkali Company in Cleveland. Jack has been keeping in shape playing squash and the family, Marita and daughter Susan 2½, enjoys swimming. . . . And now a few words from our single classmates, quickly because the species is rare. **Jack Kesten** is in New York City, a popular migratory locale, working as a project manager with the architectural firm of William Lescaze Associates. Attending New York Ranger hockey games and bicycling are among Jack's leisure activities. . . . **David Crockett** writes: "Where does the time go? I left Raytheon in April '65 and went to work at Westinghouse in Hyde Park, Mass. The new position involves design and materials engineering of heavy duty fans and air movers."

Down in New Haven, Conn., **Sheldon Dean** and his wife Linda have been raising an active family, Sheldon, III, 4½, William 2½, and Cynthia one month. Sheldon is supervisor of the finishing group, Metals Research Laboratory of Olin-Mathieson Chemical Corporation. He has been active in local politics and serves on the Town Republican Finance Committee and also teaches a course in political participation to Olin employees. And Sundays?—church choir! . . . **Ralph Morrill** is president of Environmental Research Associates, Inc. A registered architect, Ralph and his family are living in Auburn, Ala. Milly and Ralph have two girls, Kinley Ann 7 and Heather Lee 6. . . . **Edward Wright** is a systems engineer with NASA and lives in Titusville, Fla. Ed is married, and he and Winifred have Dana 5 and Eric 3 to share the family boating and fishing interests. . . . **Joe Timms** is senior engineer in charge of construction of compressor stations and pipelines for Consolidated Gas Supply Corporation in West Virginia, Pennsylv-

The new niobium-tin tape used to construct this superconducting magnet-in-miniature was invented by Mark G. Benz, '59, a metallurgist at the General Electric Research and Development Center, Schenectady, N.Y. The magnet is small enough to be held in a man's hand, yet can generate a magnetic field three times stronger than can be generated by the orthodox "man-size" magnet.



vania, and New York. Cindy 6 and Becky 4 are Joe and Annabel's two little girls. . . . **Don Helber** is wearing two hats, one as a senior engineer at TRW Systems and the other as a consulting engineer with Helber Associates. He is a registered professional engineer in California. Don, Rollene, and their girls, Lisa 8, Kristen 5, and Mara 4, are living in Fountain Valley. Don is also serving as vice-president of the Urbana Community Organization. . . . A note from **Robert Arzt** arrived: "Just spent one year at the Technische Hochschule in Munich doing post-doctoral work in physics. Phyllis and I, along with Jennifer, 14 months, are now in Tonawanda, N.Y., where I am working at the Linde Laboratory of Union Carbide. . . . **Robert Schwartz** replied to my post card asking about his recent activities and in response to the question about children answered: "Who is in a hurry?" The only thing I can say, Bob, is read the above! Bob is a staff engineer in the display department at Raytheon in Wayland and recently served as publicity and registration chairman of the Seventh National Symposium of the Society for Information Display. Bob and Phyllis are living in Randolph, Mass.—**Michael E. Brose**, Secretary, 1171 North Street, Walpole, Mass.; **Antonia D. Schuman**, Western Associate, 22400 Napa Street, Canoga Park, Calif.



Army Major, John A. Poteat, Jr., '59, completed in January five months of study at the Armed Forces Staff College at Norfolk, Va.

'59

From the land of press clippings comes word that **Wayne Mock** has been named a Peace Corps associate director in Peru. Wayne will be assigned to the programming and training office to provide administrative support for the 390 volunteers now serving in that country. He has served as an assistant professor of business at Columbia, an assistant professor of marketing at Wisconsin, and was a consultant to the Equal Employment Opportunity Commission in New York last summer. . . . Among the technical appointments in the news are those of **David Ludwig**, **James Poor**, and **James Simpson**. Dave has recently been appointed director of engineering at the Nexus Research Laboratory, a local manufacturer of electronic components. Since 1964 he has been manager of receiver engineering at General Electric Laboratories. Jim Poor has been promoted to department head of range support at MITRE, while James Simpson has gone to the High Energy Division of Argonne National Laboratory as an assistant physicist. . . . From a biographical note on a

recent technical paper on "Whisker-Strengthened Materials" comes news of **Richard Krock**. Dick holds the distinction of having earned M.I.T.'s first doctorate in materials science (1962.) He's employed as a group manager at P. R. Mallory's Laboratory for Physical Science where he does research on fiber growth, composites, and powder metallurgy. Dick also has a college freshman text on science of solids to his credit.—**Glenn Zeiders**, Secretary, 3 Rose Avenue, Watertown, Mass. 02172

'60

A postcard from **Mike Rosner**: "I want to fill you in on what's been happening to Joan and myself recently. We have two boys Jordan 3 and Douglas 1, both enjoying the California sun. I am now in the Navy stationed at the Naval Training Center here in San Diego. After graduation from N.Y.U. School of Medicine in 1964, I interned and had a year of residency at Bellevue Hospital in New York. After discharge from the Navy I plan to complete my residency in internal medicine. We may eventually settle here in sunny California, but that is a few years off yet. I hope to visit M.I.T. if I get to the Boston area." . . . **Nelson Conover**, now a major in the Army, has been awarded the Bronze Star Medal for heroism; he received the award during ceremonies on January 25 at Phan Rang, Vietnam. To quote from the Army press release: "Serving as engineer staff officer for the 1st Brigade, Major Conover took part in Operations Hawthorne, Beauregard, John Paul Jones and Seward from June to October 1966. During these operations he was frequently exposed to danger while supervising the engineer effort being provided in support of the forward elements of the brigade. He made several on-site surveys of critical construction projects which were scheduled for accomplishment in Viet Cong controlled areas. Major Conover also accompanied minesweeping parties deep into enemy territory and located in areas which were the scene of continuing combat operations. The major, brigade-engineer for the last brigade, entered on active duty in 1953 and was last assigned in Washington, D.C. His wife, Bettie, lives in Auburn, Ala." . . . **William Jarnagin** is with Project MAC and had an article in the January issue of *Electronic Design* titled, "Will the Machines Eventually Outwit Man?" (The answer, by the way, is that they already do in some sense.) **Richard Mills**, XV, V '54, S.M. XV'60, is manager of Project MAC; he will be on a panel at the Spring Joint Computer Conference next week. . . . **Ken Graham** has been appointed manager for crew safety in Aerospace Corporation's Titan III development directorate. He will have responsibilities for developing pilot safety requirements for manned versions of the Titan III family of launch vehicles. Ken joined Aerospace in 1965; before then he had been a project officer in the Gemini launch vehicle directorate. He was previously associated

with the AVCO-Everett Research Laboratory and the United Aircraft Research Laboratory. He received an Air Force Commendation Medal in 1965 for his contributions to the Gemini pilot safety program. Ken and his family live in Thousand Oaks, Calif. Air Force Major **David Roberts** has entered the Armed Forces Staff College at Norfolk, Va. He is one of 27 officers and key civilians from the U.S. and allied nations selected to attend the five-month Department of Defense School; he was previously assigned as a staff weather officer at Fort Lee Air Force Station. . . . **George Delehanty** is an assistant professor of economics at Northwestern University; he teaches courses in labor economics, economic principles, and income and employment theory. He is a member of the Industrial Relations Research Association and American Economic Association. . . . **Marvin Schuster** is with Westinghouse; he is presently at the Solid State Technology Laboratory where he is concerned with the advanced development of monolithic silicon sensor mosaics and with their adaptation to solid state imaging systems. He has been with Westinghouse since 1960, has published papers and has given presentations dealing with silicon sensor mosaics at several technical conferences, and has patents pending in this field. . . . **Cyril Pierce** has received his Ph.D. from Ohio State University. He is employed at the Air Force Materials Lab in Dayton. . . . **Dick Cahaly** has been named assistant department manager at Polaroid. He joined the company in 1964 as a process engineer and has now been made responsible for the manufacture of the developer contained in the pods on each Polaroid land film pack or roll. . . . **Dick Solomon** spoke to the Dearborn (Michigan) Branch of the American Association of University Women at the January general meeting; his topic was "Contemporary China." Dick has his Ph.D. from M.I.T. and has done graduate work at Harvard and Yale. Since 1963 he has been active in research on Communist China and has published in the *China Quarterly*, the M.I.T. Center for International Studies, and the *Yale Review*. If you're in Boston, give me a call. Hope

Major Nelson P. Conover, '60, receives the Bronze Star Medal for heroism from Brigadier General Willard Pearson, commanding general of the 1st Brigade, 101st Airborne Division, during ceremonies January 25 at Phan Rang, Vietnam.



Randall H. Kunz, '62



to run into lots of you at Alumni Day.—**Linda G. Sprague**, 345 Brookline St., Cambridge, Mass. 02139

'62

Hal Waller wrote that he was married last June and is living with his wife Diane in Silver Spring, Md. He is involved in investigation into the political attitudes of scientists and will obtain his Ph.D. from Georgetown University. In September he will move to Montreal where he will become an assistant professor of political science at McGill University. . . . **Scott E. Pardee**, who received his Ph.D. at M.I.T. in 1962, was named manager, foreign department, of the Federal Reserve Bank of New York. . . . **Richard Holland**, who has received his B.S., M.S. and Ph.D. degrees from M.I.T. in electrical engineering, is working for the Sandia Corporation in Albuquerque, N.M., on piezoelectric phenomena. Previously he worked on antenna and radar systems at Raytheon Company in Wayland, Mass., and on waveguide transition sections at Hewlett-Packard Company in Palo Alto, Calif. . . . **David J. Bromer** has joined Raytheon Company's Research Division as senior research scientist. He received an M.S. in 1964 and a Ph.D. in 1966, both from M.I.T. He was previously with Avco Corporation. . . . **Randall H. Kunz**, who received both his S.B. and S.M. in Course XV at M.I.T., has been named head of the business analysis section, mechanical and services department, by Humble Oil and Refining Company's Bayway Refinery. He will supervise the interpretation of accounting records and special financial studies. He joined Bayway in New Jersey as an analyst in the business service division. Two years later he became an engineer in the coordination division responsible for fuel products terminal studies and power-former optimization work. He is active in community affairs and acts as an advisor to the Fanwood-Scotch Plains Jaycees. He is a member of the First Congregational Church in Westfield where he teaches Sunday school and is chairman of the Couples Club. He lives with his wife Elizabeth and their daughter in Westfield, N.J. . . . **George T. Weiner**, who received his Ph.D. in economics from M.I.T. in 1962, is now an assistant professor at Lake Forest College in Chicago, Illinois. . . . **John F. Maloney**, '65, and **Theodore P. Labuza** were each co-authors of articles that appeared in the December, 1966, issue of the *Journal of Food Science*. John's article was entitled "Au-

toxidation of Methyl Linoleate in Freeze-Dried Model Systems I Effect of Water on the Autocatalyzed Oxidation." Theodore's article was on the same subject, "II Effect of Water on Cobalt-Catalyzed Oxidation." I was in Salt Lake City, San Francisco, and Phoenix last week and ran into **Jerry Parker** on a flight between San Francisco and Los Angeles. He is working for a firm in San José whose name evades me, but it might be Siliconix . . . This is our reunion issue, and I look forward to seeing many of you at the White Cliffs.—**Jerry Katell**, Secretary, 310 Hoge Building, Seattle, Wash. 98104

'64

The only things that saved the column from a total blank this month was a note from **Charles Abzug** forwarded by the Alumni Office, a letter from **Pete Staecker**, and supper last night (April 11) with **Steve Glassman**, our Class President. To gather news for the next volume of Technology Review beginning in November, Steve and I discussed sending out a newsletter and questionnaire to the entire class over this summer. So if our limited resources permit (total class treasury stands at \$57.49), you can expect to be getting the mailing in the early part of the summer. . . . Charles Abzug is currently in the graduate school of Basic Medical Sciences of New York Medical College, and expects to get his M.S. in physiology in June. . . . **Mark Barron** was recently married and is finishing work on his Ph.D. in E.E. at Stanford. . . . **Howard Cedar** is at N.Y.U. Med School. He was married to the former Tzippi Kriger of New York in March. . . . Steve Glassman was up in Cambridge in April to attend a computer conference at M.I.T. in connection with his job with NASA. Steve holds a full-time job as an assistant to a branch chief in NASA's Technology Utilization Division. He has also been attending Georgetown Law School at night for three years where he is an editor on the Law Review and about three-fourths through the LLB program. Except for the two letters, Steve has provided all the news for this issue. . . . **Warren Lang** is working on his Ph.D. in English at the U. of Indiana. . . . **Glen Larson** received his M.S. in E.E. at George Washington U. He and his wife Ellie are going to Nashua, N.H., where Glen will be working for Sanders Associates in computer design. . . . **Charlie Mabie** is working for ITT and was recently sent to work on a project in Hawaii. . . . Pete Staecker pleaded that I correct the error in the January issue that accused him of being the coach of the M.I.T. heavyweight crew! The correct adjective is lightweight. Also, in order that the E.E. Department not get the impression that he rides around in coaching launches all day, he asked that it be mentioned that he is a hard-working student in the engineering program who is trying to get his foot in the doctoral door. A letter of his was published in *Electronics Letters* last year. . . . **Len Theran** received his MBA at

Stanford last June and is now working in the Boston area. . . . **Joel Westerman** was married to Miss Nancy Goldstein last summer. . . . As a closing note I might mention that by the time this issue is out, I will hopefully be a graduate of Harvard Law School and have returned to my home in Memphis to practice law. My wife Betsy will have also just graduated (in Education at B.U.) and will be making the transition from her native New England to the South. . . . A pleasant summer to everyone.—**Ron Gilman**, 2227 Vollintine Ave., Memphis, Tenn. 38108

'66

Technology Review publishes the following note correcting an announcement (in the November, 1966, issue) of the marriage of **Leonard W. Silver**:

"My wife, the former Miriam Arenberg of Simmons College, was married to me (**Leonard Levin**, that is) last June 12 in the M.I.T. Chapel. We are now both graduate students at the University of Washington in Seattle, she in clinical psychology, and I in physical oceanography.—**Leonard Levin**, '66, 4255 N.E. 125th Street, Seattle, Wash. 98125."

Graduate Students

V

The following announcements are from the *Harvard Alumni Bulletin*. "**George R. Murray, Jr.**, has been appointed associate professor in engineering economic systems at Stanford University." He was awarded the A.B. degree at Harvard in '52, his Ph.D. degree in physical chemistry from M.I.T. in '56. While at M.I.T. he was a National Science Foundation Fellow for three years and was awarded the General Electric Coffin Fellowship in national competition for the academic year 1955-56. Following the award of the doctorate he spent one year at Oxford University under a National Science Foundation postdoctoral grant and joined the staff of Pennsylvania State University in the fall of 1957. From 1959 through 1966 he was associated with the Arthur D. Little Company, Acorn Park, Cambridge, where his specialty was in operations research. . . . "**Roger A. Latham**, who has a Ph.D. degree in organic chemistry from M.I.T., is with the Commercial Resins Division of Du Pont's Plastics Department at the Experimental Station." He was awarded the A.B. degree at Harvard in '61, the Ph.D. degree M.I.T. in September '66 and chose to enter industry. . . . Dr. Wideming Lewis, President of Lehigh University, has announced the appointment of **A. C. Zettlemoyer** as the first vice-president for research in the 101 year history of the institution. Dr. Zettlemoyer came to M.I.T. from Lehigh and was awarded the doctorate in physical chemistry in 1941. He returned to Lehigh and is internationally known for his 25 years service as a teacher and director of re-

search. . . . As evidence that some of our graduates with advanced degrees in chemistry enter the management field, a news release from the Public Relations Department of the Union Carbide Corporation has announced the appointment of **Richard W. Eddy** as executive vice-president of the Chemicals and Plastics Operations Division. Richard Eddy was awarded the B.S. degree in chemistry (Ohio University, 1940) and joined the staff of Union Carbide as a laboratory technician in the South Charleston, W. Va., plant of the Chemical Division. During World War II he served as a major in the U.S. Chemical Corps and was awarded the Croix de Guerre with Three Palms while attached to the Corps Expeditionnaire Francais in Italy. He entered M.I.T. in September 1946 under the G.I. Bill, was awarded the S.M. degree in chemistry in 1948. He was assigned to the New York office of Union Carbide on completion of his requirements, served in chemical sales development and later as general manager, chemical intermediates. He was appointed vice-president and business area general manager, chemical intermediates department, in 1965 and promoted on March 9, 1967. He will be based in the New York office. . . . **Richard F. W. Bader**, Professor of Chemistry at McMaster University, Hamilton, Ontario, has been awarded the E. R. W. Steacie Memorial Fellowship for 1967 by the National Research Council. Dr. Bader graduated from McMaster University B.Sc. in honors chemistry in 1953 and was awarded his M.Sc. in 1955 and his Ph.D. in physical chemistry from M.I.T. in 1958. He attended Cambridge University, England, 1958-59, as a postdoctoral fellow and joined the staff of the University of Ottawa as an assistant professor in 1959. He was appointed an associate professor in 1962, joined the staff of McMaster University (1963) and was named professor in 1966. Dr. Bader is the third recipient of the fellowship which was established by the National Research Council in 1963 to perpetuate the name of Dr. E. W. R. Steacie, President of the Council from 1952 to 1962, and must be held in a Canadian University or affiliated University and is normally held by a university staff member at his own university. The fellowship is limited to research in the natural sciences and is awarded for a two-year period. Dr. Bader is a theoretical chemist and one of Professor Gardner Swain's students at M.I.T.

Recent changes in address: **Elizabeth E. MacLachlan**, Ph.D. '57 (nee Betty Pegues) 4565 Simon Rd., Twin Oaks, Wilmington, Del. 19803. Betty has a B.S. Louisiana State, M.S. University of Texas, and came to M.I.T. in September 1954. **Ronald Chandross**, Ph.D. 1961, came to M.I.T. in September 1956 from Brooklyn Polytechnic Institution. He holds a postdoctoral appointment in the Department of Biology. . . . **Glenn D. Daves**, Ph.D. '64, is at 328 Chester St., Menlo Park, Calif. 94025. Glenn came to M.I.T. from Arizona State in September 1961, and we assume he is still at the Stanford Research Institute, Menlo Park, Calif. **John Piper**, Ph.D. 1960, 1114 Wembley Road, Greenville, N. C. 29607. He came to M.I.T. in

September 1956 from Trinity College, Hartford, Conn. . . . The undersigned welcomes letters for publication as edited from those who would like to let their associates while at M.I.T. as candidates for an advanced degree know where they are and what they are doing.—**L. F. Hamilton**, Correspondent, Room 4-258, M.I.T., Cambridge, Mass. 02139

VI

Freddy Ba Hli, Sc.D. '53, has responded to our request for a report on his activities, and we are publishing the major part of his letter in order to bring Freddy's story to his friends in his own language. His address is 327, U Wisara Road, Rangoon, Burma. "In response to your wish to write a story about me in the Technology Review I attach herewith something about what I have been doing, bearing in mind that what I have been able to achieve is due to the guidance of my parents and my teachers. After getting the doctor of science degree from M.I.T. in 1953, I returned to Burma via Japan, thus completing my first trip around the world as I had come to America via England. I was appointed as senior research officer in the State Industrial Research Institute where I was given the responsibility of setting up the Physics and Engineering Research Department. The State Industrial Research Institute at that time had three other departments, viz. the Metallurgy Research Department, the Cellulose Research Department and the Analysis Department. In 1954 I helped to set up the Instruments Department and the Applied Chemistry Research Department as there was a pressing need for activities in these fields for the country. In 1955 I was promoted to director of research while the State Industrial Research Institute was reorganized as the Union of Burma Applied Research Institute by Dr. Christopher E. Barthel of the Armour Research Foundation who served the Burmese Government at that time as director general of the Institute under the U. S. Technical Aid Program. Shortly afterwards the United Nations announced that the first Atoms for Peace Conference would be held in Geneva, and I was appointed, in addition to my other duties, as acting director of the Union of Burma Atomic Energy Center. In mid-1955 I visited the United States Atomic Energy Laboratory at Berkeley, Argonne, Oak Ridge, and Brookhaven and the M.I.T. particle accelerators. Then I visited the Canadian Atomic Energy Laboratories at Chalk River and some European Atomic Research Laboratories before attending the Geneva Atoms for Peace Conference in Switzerland. In 1957 I again came to the United States, this time to attend the Conference at the United Nations Headquarters for setting up the International Atomic Energy Agency. On my way back to Burma I attended the opening of the Calder Hall Atomic Power Station in England by Her Majesty the Queen. This was my third trip around the world. In December 1957 I was married to Ma Myint Thwe and now have a daughter

born in 1959 and a son born in 1961. My wife and I visited Europe in 1958 when I attended the Second Atoms for Peace Conference in Geneva. In 1961 I was sent by my government to Poland and the USSR to see the research laboratories of their Academies of Science. On my way back I attended the United Nations Conference on Solar Energy, Wind Energy, and Geothermal Energy held in Rome, Italy, as our Research Institute was engaged in research in solar and wind energy and subsequently we have been able to contribute substantially to the country's development by utilizing these free sources of energy. The Union of Burma Applied Research Institute (UBARI) has expanded its activities and now has the following additional departments: Technical Information Center, Pharmaceutical Research, Food Research, Standards, Ceramics Research, Paper and Cellulose Research, and the Union of Burma Atomic Energy Center. Research in the chemical and allied sciences predominates in our Institute, as the country's primary industries are based on agricultural, forest, and mineral products.

My primary education in chemistry during my undergraduate days has come in very useful, and I am now more concerned with chemical industries than with electrical industries. This will explain why I was sent in 1963 as a member of the Chemical Fertilizers Study Mission to India, Pakistan, Italy, France, Federal Republic of Germany and the Netherlands and again in 1966 to Germany and the Netherlands to study their chemical fertilizer factories. In 1965 I led a government delegation of Burmese engineers to the United Arab Republic to study their food canning, cotton spinning and weaving factories, iron and steel industry, cement plants, research laboratories and electrical supply system including the Aswan High Dam Project. As a result two fertilizer factories of 200 tons of urea per day capacity, new cement factory, paper (from bamboo) factory, and additional cotton spinning and weaving factories are being constructed in our country, while I have suggested several other new industries to increase the economy of the nation. In addition to my work as director general of the UBARI (to which post I was promoted in 1960) I have to serve as joint secretary of Burma's Research Coordination and Development Committee, as a Fellow of the Senate of the Rangoon Arts and Science University and as a Fellow of the Senate of the Rangoon Institute of Technology. (The professors of civil engineering, electrical engineering, and chemical engineering, who are the heads of their departments, are M.I.T. alumni.) I may say that the prestige and the training of M.I.T. have helped us greatly in our work here. In particular I am ever grateful to you for admitting me to M.I.T. as a graduate student and to Professor Guillemin and Dr. Cerrillo for guiding my thesis research and to Professors Gordon Brown, Wiesner and Zimmerman for guiding my studies. I also remember with respect and gratitude Professors Trump, Beranek, Gardner, Edgerton, Chu, Lee, Arguimbau, Campbell, Mason, Linvills, and Moon, and Dean Hazen of the Elec-

trical Engineering Department, Professor Chalmers of the Admissions Office, Director Frank Verzuh of the Statistical Services, Professor Whitman of Chemical Engineering, Dr. Avery Ashdown of the Graduate House, Professor Horwood of the Sanitary Engineering Department (who spent a few years at the Rangoon Faculty of Engineering), Professor Den Hartog and Professor Finch of the Mechanical Engineering Department, Professor Norbert Wiener of the Mathematics Department and President Killian. I also cherish pleasant memories of my associates while at M.I.T. such as Emmett Bradley, Steve Moxley, Andre Barbeau, Faqir Kohli (of India), Charles Desoer, Francis Lee, Emery Reeves, Dan Streeter, Mike Strieby, Gene Zeoli, Bob O'Connell, and Earle Dubois amongst others."

Paul E. Stoff, S.M. '49, E.E. '51, Sc.D. '55, was at M.I.T. in February recruiting for Hewlett-Packard. He is currently director of the Electronics Research Laboratory of the H-P Laboratories in Palo Alto and describes his activities as synthesis of new instrumentation development for general applications. Special interests are in biomedical instruments, medical ultrasonics, and physical electronics. Formerly he was manager of the audio-video division (1960-'63) and manager of the advanced research and development group (1963-'66). Paul finished his undergraduate work at the University of Colorado in 1944, and after two years in the Navy accepted a teaching assistantship at M.I.T. which he held during his graduate years, and which led to his assistant professorship in 1955. In 1956 he moved to the General Electric Company in San Jose, Calif., where he worked on atomic power equipment until he joined Hewlett-Packard in 1958. . . . **Marcello Corradetti**, S.M. '59, joined General Instrument Europe in Naples, Italy, on April 1, 1967, as head of special development in M.O.S. (metal-oxide-silicon) technology. He has been with IBM Germany in Böblingen near Stuttgart from 1960 until his recent change of position. His latest activities at IBM were in the development of integrated circuits for digital and linear applications. Earlier he was working on electromagnetic compatibility among electronic systems, with special attention to radio-frequency interference. . . . **Dieter M. Eisenlohr**, S.M. '59, visited M.I.T. and friends in Cambridge over the Lincoln's Birthday weekend. After an automobile tour of the United States in the summer of 1959, he began work with Bell Telephone Laboratories at Murray Hill. His work in data communication development involved the treatment of business machine signals in order to transmit them over the telephone network. His department was moved to Holmdel in 1962 where he was transferred in 1963 to the customer telephone systems laboratory. He has recently been working on the development of an electronic PBX using a metallic switching network. Dieter takes his vacation over the Christmas holidays and returns to Germany visiting his family in Heidelberg. He received the degree Diplom Ingenieur from the Technische Hochschule, Karlsruhe in June 1957. . . . **Vinton B. Haas, Jr.**, S.M. '49,

E.E. '52, Sc.D. '56, has recently been made a member of the University Senate of the University of Connecticut where he has been professor of electrical engineering during the past ten years. He is acting head of the department during the present spring term and for six or seven years has been on the executive committee of the graduate school. His specialty is automatic control, mostly at the graduate level. He has developed a graduate subject entitled optimal control.

William A. Stellrecht, S.M. '31, has been for many years a "patentanwalt" in a large firm which deals in the processing of patents. Your correspondent had the pleasure of visiting his home in Sillenbuch, a suburb of Stuttgart, Germany, in 1954 and 1961 and of becoming acquainted with his wife and three daughters. At M.I.T. he was a member of that closely knit group of graduate students who studied part-time at the Lynn works of the General Electric Company during their first year and a half, and completed S.M. requirements with a final full-time term at the Institute. He writes that he was pleased to see mention of his classmates **James J. Byrne**, S.M. '31, and **Lawrence F. Stauder**, S.M. '31, in the November Technology Review. He speaks of the many trips he made with Stauder including Schenectady and Mount Marcy. He did a joint thesis with **A. Eugene Fitzgerald**, S.M. '31, Sc.D. '37, on power system stability under Professor Dahl. Dr. Fitzgerald is now vice-president for academic affairs at Northeastern University and Professor Stauder is associate professor of electrical engineering at the University of Notre Dame (Ind.). The Stellrecht address is Walter Flex Strasse, 27, Sillenbuch-Stuttgart, Germany. . . . **Arthur J. Schneider**, S.M. '59, E.E. '61, Ph.D. '63, is on leave this academic year from the University of Wisconsin where he is assistant professor of electrical engineering. He is working at UNIVAC in in Roseville, Minn. (a suburb of St. Paul), as a principal development engineer in

Army Major Thomas G. Adcock, VI, S.M. '63, (right) receives congratulations and the Air Medal from Lieutenant Colonel William W. Chandler, commander of the 54th Signal Battalion, Nha Trang, Vietnam, on January 18. Major Adcock is operations and training officer for the battalion and was presented the award for combat aerial support of ground operations in Vietnam.



charge of a group working on new memories for UNIVAC computers. He is teaching an evening course on computers at the University of Minnesota. He and his wife Carol have rented a new townhouse in Maplewood where they can have a piano which Arthur enjoys playing. He reports that they are attending the Minneapolis Symphony concerts. His address this year is 1711 N. Gurney St., St. Paul, Minn. 55117. . . . **William B. Macurdy**, Ph.D. '62, has been promoted to head of the Picturephone and Broadband Switching Department at Bell Telephone Laboratories in Holmdel, N.J. In his new post he will be responsible for planning the switching for new telephone services, such as picture and high-speed data transmission systems which require transmission channels of extra high capacity. He received the A.B. degree (summa cum laude, Phi Beta Kappa) in 1955 and M.S. in 1957, both from Dartmouth College. He then entered the employ of Bell Telephone Laboratories as a member of the company's graduate Communications Development Training (CDT) program under which he received the M.E.E. degree from New York University in 1959 and then attended the doctoral program at M.I.T. His doctoral thesis under the supervision of Professor Samuel J. Mason was entitled "Mathematical Models for Sensory Communication." When he returned to Bell Labs in 1962 he was engaged in a study of stored program computer assistance to electromechanical switching systems, becoming a supervisor in 1963.

. . . **Donald E. Garrett**, S.M. '50, has been named manager of engineering for General Electric's Television Receiver Department in Syracuse. He joined General Electric in 1950 and held various engineering and managerial assignments in his present department until 1962 when he became manager of engineering in G.E.'s Radio Receiver Department in Utica. In 1964 he was named manager of manufacturing at Utica, the post he held at the time of his recent appointment. He did his undergraduate work at the University of Kansas and the University of Washington, entering M.I.T. in 1948 as a research assistant under the supervision of Professor Henry J. Zimmermann. He was married to the former Vivian Peltola of Auburn, Wash., before coming to M.I.T. They now have six daughters and a son. . . . **C. Neil Berglund**, S.M. '61, received the Ph.D. degree in electrical engineering from Stanford University in 1964. Since that time he has been with Bell Telephone Laboratories at Murray Hill. He has recently been investigating the energy distribution of surface states at the interface between silicon and silicon dioxide in M.O.S. (metal-oxide-silicon) structure. Some of his low-frequency measurement techniques were reported in a paper in the *IEEE Transactions on Electron Devices* for October 1966. Mr. Berglund came to M.I.T. from Queen's University in Kingston, Ontario, and his thesis research under the supervision of Mr. Godfrey T. Coate dealt with noise in tunnel devices.

Frank M. Verzuh, S.M. '46, Sc.D. '52, electronic data processing consultant, is currently engaged in the development

and installation of a nation-wide management information system which in the 1970's will interconnect all of 2200 retail units of Safeway Stores with a central computing facility. In the installation now underway each of the 18 divisions will submit their data-processing applications to the IBM Model 65 central computer through 18 Model 20 division terminals connected on-line through leased telephone channels. The trick is to give each of the 18 users the illusion that they have exclusive use of the Model 65 central computer. Obviously there are some interesting implementation problems involved. Frank came to M.I.T. from the University of Denver in the summer of 1940 as research assistant to work under the late Professor S. H. Caldwell on the "new" differential analyzer which was at that time undergoing shake downs, trials, and modifications. His doctoral thesis was entitled "Solution of Boundary-Value Problems on Automatic Computing Equipment." At M.I.T. he was director of the office of statistical services, director of operations with Whirlwind Computer and director of operations in the Computation Center, leaving in 1960 to become manager of the operations research department of Merrill Lynch where he had been consultant since 1955. A Merrill Lynch publication in June 1959 described Verzuh as the "human computer" and said he was envisioning the time when "our daily operations will be so streamlined that we can use the lightning computer to figure market research, moving trend averages, stock price indexes, and all types of market and financial statistics." . . . **Nils M. Bengtson**, S.M. '48, was named director of the Research and Development Directorate, Redstone (Ala.) Arsenal upon his return in late 1966 from Viet Nam as commander, 60th Ordnance Group. A West Pointer in the class of 1940, he came to M.I.T. in 1946 as a major. From 1952 to 1955 he was the United States representative for guided missiles in the United Kingdom, and from 1955 to 1957 served as liaison officer between the Army and the Navy Polaris missile project. He received a master's degree in business administration from George Washington University in 1962. Col. Bengtson was assigned to Viet Nam in October 1965 after serving three years as commander of the Army Research Office, Durham, N.C. He has been decorated with the Legion of Merit, Air Medal, Bronze Star, Commendation Ribbon with Medal Pendant and two Oak Leaf Clusters, Vietnamese Medal of Merit and Vietnamese Service Medal.

P. Gene Smith, S.M. '48, E.E. '51, is director of the Radiation Systems Laboratory of the Research Triangle Institute, Research Triangle Park, N.C. He is also teaching a course in communications at the University of North Carolina where he is adjunct professor of electrical engineering. He came to M.I.T. with a B.S. degree from Missouri School of Mines and Metallurgy following military service as radar officer on the U.S.S. *Princeton*. With the Sperry Gyroscope Company in Great Neck, N.Y., he was engaged in microwave development and systems studies for radar, missile, and countermeasures sys-

tems. He organized a radar group and directed Doppler radar studies at Sperry's plant in Sunnyvale, Calif., and in 1962 moved to the Sperry Rand Research Center in Sudbury, Mass., joining Research Triangle Institute in 1963. . . . **Theodore Moreno**, Sc.D. '49, has been appointed group vice-president, equipment group, at Varian Associates, where he has been employed since 1951 as senior engineer and manager of research and development for the Tube Division. In 1960 he was elected vice-president and manager, Palo Alto Tube Division. He came to M.I.T. in 1946 following A.B. and A.M. degrees at Stanford University, and employment with Sperry Gyroscope Company and Standard Oil of California. . . . **Gerald Rabow**, S.M. '52, is a senior scientist at ITT Federal Laboratories where he is engaged in systems work and the development of spread-spectrum technologies. He has taken a year's leave of absence to make a special study of the systems approach to social problems. His undergraduate work was done at the City College of New York, and since leaving M.I.T. he has fulfilled requirements for the Sc.D. degree at Columbia University. . . . **Charles A. Zraket**, S.M. '53, was recently named a vice-president of the MITRE Corporation and heads the new Washington Operations which combines into a single organization MITRE's two Washington-area divisions, the MITRE (DCA) division and the Air Traffic Systems division. The operation is located, for the most part, at Bailey's Crossroads, Virginia. Mr. Zraket had been serving as technical director of both divisions. Prior to joining MITRE in 1958 as department head of advanced systems planning, he spent seven years with M.I.T.'s Digital Computer Laboratory and Lincoln Laboratory where he participated as a section and associate group leader in the design and development of the SAGE air defense system and as group leader of advanced SAGE development. His undergraduate work was done at Northeastern University. He resides in Falls Church, Va., with his wife and four children. . . . **Robert B. Streets, Jr.**, E.E. '59, is a research specialist in the Aerospace division of the Boeing Company and teaches a graduate course in automatic control at Seattle University. He came to M.I.T. in 1956 following B.S. and M.S. programs at the University of Arizona, holding a research assistantship in the Electronic Systems Laboratory during his final year at M.I.T. Before going to Boeing in 1964 he was employed by Ramo-Wooldridge Corporation and Aerospace Corporation. He received the Ph.D. degree from the University of Arizona in 1964.—**Karl L. Wildes**, Correspondent, Room 4-232, M.I.T., Cambridge, Mass. 02139

XIII-A

Before we start this month's notes your Secretary wants to correct an error made by the typesetter in the April issue. The paper on "Management Information Systems for U.S. Naval Shipyards" was presented by Commander **Gerald D. Sylves-**

ter, USN, M.I.T. '61, and not **E. J. Otth**, M.I.T. '55, as reported. Gerry is currently in charge of efforts in the Naval Ship Systems Command in the use of computers for shipyard management. . . . The Department of Naval Architecture and Marine Engineering conducted a Symposium at M.I.T. on April 6. It was well attended by personnel in the marine field. Among the XIII-A grads was Captain **Richards T. Miller**, USN, M.I.T. '51. Dick has been busy in the ship design business ever since leaving M.I.T. He is now head of the Ship Systems Engineering and Design Department in the Naval Ship Engineering Center. This is Dick's third tour in Washington in the design game and follows a tour as C.O. and director of the Mine Defense Lab at Panama City, Fla. . . . Captain **W. M. Nicholson**, USN, M.I.T. '48, is currently heading up the Navy's Deep Submergence Program in Washington. Nick is no stranger to M.I.T. having spent three years on the faculty as professor of naval construction from 1962-65. After leaving M.I.T. and before being assigned to the Deep Submergence Program, Nick was director of ship design, Bureau of Ships, for about one year. . . . Captain **M. L. Pittman**, USN, M.I.T. '54, is currently executive director, Research Directorate, Naval Ship Systems Command. Since graduation Milan has followed the R. & D. trail with duty at the David Taylor Model Basin and several tours in ship research and ship silencing. . . . **E. A. Taylor**, M.I.T. '48, is currently working for Lockheed Aircraft Corporation in the Ocean Systems Division.

Several XIII-A grads visited the Department during the month to participate in seminars or discussion groups. **W. F. Searle, Jr.**, '52, Captain, U.S. Navy, was the speaker at a seminar on ocean engineering and salvage. Since graduation Bill has been assigned principally to duties involving diving and salvage. He has been at various times the Philippines area salvage officer, advisor to the Thai Navy, fleet salvage officer, head of the experimental diving unit, and now is the supervisor of salvage, U.S. Navy. Bill's talk was particularly timely in view of the Department's plans to expand in the area of ocean engineering and to award graduate degrees in this field beginning next year. Bill discussed the many problems associated with salvage and ocean engineering and defined an ocean engineer as "A man with a Ph.D. in Seamanship." His talk demonstrated the need for expanded engineering effort in this challenging field. . . . **T. F. Donnelly**, '65, Lieutenant Commander, USN, made a luncheon visit with members of the class of '67 and '68 to tell of his experiences in Boston Naval Shipyard as docking officer and assistant planning and estimating superintendent. A very lively discussion was held concerning the role of a Naval officer in a government shipyard. In covering such technical problems as docking damaged ships, Tom drew upon his recent experience with the USS *Essex*. . . . **C. R. Brandt**, '56, Commander, U.S. Navy, visited M.I.T. to have lunch with the XIII-A students and tell of his experiences as supervisor of shipbuilding at Quincy

Division, General Dynamics Corporation. After graduation from M.I.T. Carl saw duty in the Philadelphia Naval Shipyard and the Ship Repair Facility, Sasebo, Japan, before coming to New England. Carl and Nancy have lived in Hingham since 1964. Nancy is back at work as librarian in the local school and keeps busy with this assignment plus the care of four lively children. . . . The New London area is a haven for several XIII-A graduates. One of these is **C. O. Swanson**, '53, Commander, U.S. Navy. Upon graduation Chuck reported to Submarine School and then to the USS *Croaker*. This was followed by two years on the waterfront in new construction at Portsmouth Naval Shipyard. Washington called and Chuck spent four years in that city while working on submarine programs at the David Taylor Model Basin and the Bureau of Ships. Since 1961 he has been in New England working on submarines at Portsmouth and New London. He is now inspection officer in the office of the supervisor of shipbuilding in Groton, Conn. . . . **F. F. Manganaro**, '56, Commander, U.S. Navy, is also in the New London area and has also followed a career in submarines. Frank went to Pearl Harbor after graduation where he worked on submarine conversions and overhauls. He then spent four years in the Bureau of Ships actively engaged in submarine design and program management. Since 1963 he has been in the office of the supervisor of shipbuilding, Groton, where he is currently the planning and design officer. . . . **LCDR J. P. Didier, Jr.**, USN, M.I.T. '65, and **LCDR C. C. Morris**, USN, M.I.T. '65. Pete and Clyde were ordered to the office of the supervisor of shipbuilding, conversion and repair, USN, Groton, Conn., directly from M.I.T. Since that time they have been assigned as assistant design project officers for new construction nuclear attack submarines. **LCDR Jack J. Turner**, USN, M.I.T. '64, reported to SupShip, Groton, upon graduation and was assigned as a waterfront ship coordinator for a Polaris submarine under construction. After a period of approximately one year he was transferred to the design division and assigned duties as an assistant design project officer for *Sturgeon* (SSN637), the first of the newest class of nuclear attack submarines. **LCDR Art E. Keegan**, USN M.I.T. '62, attended Submarine School in New London, Conn., after graduation. He was assigned to a Polaris submarine and after qualification in submarines reported to SupShip, Groton, for duty as a waterfront ship coordinator for a Polaris submarine under construction. After approximately one year he was transferred to the planning and estimating division where he performed as type desk project officer for the overhaul of Polaris submarines. **LCDR Doug F. Hayman**, USN, M.I.T. '62, also attended Submarine School and was assigned to an attack submarine for duty. In 1964, after qualification in submarines, he reported to SupShip, Groton, where he was assigned as a waterfront ship coordinator for the construction of a Polaris submarine. After approximately one year he was transferred to the design division

and assigned to duty as an assistant design project officer for Polaris submarines under construction. LCDR **Phil Lyons**, USN, M.I.T. '60, attended Submarine School immediately after graduation and was ordered to a Guppy II Submarine undergoing conversion to a Guppy III. After qualification in submarines he was assigned to duty at the Puget Sound Naval Shipyard as a waterfront ship superintendent. In 1965 he reported to SupShip, Groton, and was assigned to the planning and estimating division as a type desk project officer for the overhaul and conversion of Polaris submarines.—Captain **Robert E. Stark**, Correspondent, M.I.T. Room 5-304, Cambridge, Mass. 02139

Sloan Fellows

In December the American Telephone and Telegraph Company announced the promotion of **William C. Mercer**, '56, to the position of vice-president, personnel relations, succeeding Mr. Angus S. Alston who became executive vice-president. Mr. Mercer's previous positions had been with Western Electric, New England Telephone, Indiana Bell, and most recently as vice-president, marketing, with AT&T. . . . Paul Hagan, '67, has been awarded a National Science Foundation grant for two years commencing September 1967. He was awarded the grant for studies in urban planning and development. At the same time he has been accepted as a graduate student by the Urban Planning Department at M.I.T.

Club News

Alumni Council:

The Architect and His Times

Alumni Association affairs reported at the April meeting of the Alumni Council included:

- Results of the 1967 annual election of the Alumni Association, in which more than 4,000 Alumni participated. All uncontested nominees for national offices were elected: Gregory Smith, '30, president; Ralph H. Davis, '31, and Robert C. Casselman, '39, vice-presidents; William H. MacCallum, '24, Herbert H. Howell, '42, and Robert C. Cowen, '49, members of the Executive Committee; Ralph F. Gow, '25, Donald A. Holden, '31, and Albert H. Bowker, '41, term members of the Corporation; and Ichabod F. Atwood, '03, Joseph W. Wattles, '08, R. Charles Thompson, '13, Max Seltzer, '18, George A. Johnson, '23, Arthur A. Nichols, '28, Lincoln W. Ryder, '33, Albert O. Wilson, '38, James F. Hoey, '43, Richard H. Harris, '48, George B. Hegeman, '53, Glenn P. Strehle, '58, and Thomas P. Gerrity, Jr., '63, class representatives on the Alumni Council. For the contested posts on the National Nominating Committee, the choices in the national balloting were John J. Wilson, '29, District 1 (Greater Boston); M. Arnold Wight, Jr., '40, Dis-

trict 2 (upper New England); Edward M. Peacock, '47, District 4 (upstate New York and Ontario); and William H. Correale, '24, District 5 (New York City, Long Island, and New Jersey).

- Progress toward publication of the 1967 Alumni Register, now scheduled to appear by mid-July. Orders at the pre-publication price of \$9.50 will be accepted until June, when the price will advance to \$12 per copy.

- Election of Arthur P. Alexander, '58, as the first representative to the Alumni Council from an organization of graduate alumni—in this case of master's—and doctor's degree alumni of the Sloan School of Management.

- Contributions of \$1,567,070 from 12,636 alumni to the 1967 Alumni Fund (as of Friday, April 21), reported by Philip H. Peters, '37, chairman of the Alumni Fund Board. Mr. Peters also introduced David W. Skinner, '23, Alumni Fund chairman for the Alumni Council.

An historical approach to the question of how architects relate themselves to their eras and how others assign roles to them was taken by Lawrence B. Anderson, '30, dean of the School of Architecture and Planning, in speaking to members of the Alumni Council on "An Identity Problem." Changes in culture, social organization, and technology have affected the architectural profession through the centuries. Though historically architects have been masters of an entire branch of knowledge, the disciplines which must now be embraced in the design of a building are often beyond the capacity of individual men. In the past buildings were often valued very highly simply as works of art; today we place first a more pragmatic value: a building must be an effective solution to a problem of shelter and communication. Yet, though it is obvious that our technological resources are advancing very rapidly, we do not always apply them fully and effectively in new buildings.

These and other changing requirements and conditions suggest that new kinds of professional training will be needed to prepare future architects for effective contributions as designers of cities and buildings, Dean Anderson said.

M.I.T. Club of Northern California: The "New Technology"

Scientists and engineers must chart a "new technology," based on the use of modern technological methods in the solution of large-scale and growing human problems, which will dedicate itself to advancement of the human individual, Howard W. Johnson, President of M.I.T., told members and guests of the M.I.T. Club of Northern California at a dinner meeting on April 20.

President Johnson's address implied that science and engineering had hitherto been too impersonal in their approach to such problems as mass transportation, air and water pollution, housing, education and the population explosion.

Technology is responsible for many of the major problems confronting humanity today, he declared, including the evolution of 'Big Business' and 'Big Government,' in which depersonalization some-





Paul P. Shepherd, '53, President of the M.I.T. Club of Northern California (top left), was host to M.I.T. President Howard W. Johnson and 200 alumni, wives, guests, prospective freshmen, and their parents at a club meeting on April 20. President Johnson found an enthusiastic welcome among members of the M.I.T. Class of 1971, and club members attending found a warm reception from a welcoming committee headed by Mrs. Leonard Cohen ('36).

times deprives individuals of a significant sense of participation. Technology has the responsibility, therefore, to cure some of the problems it has helped create. The 'New Technology,' as promulgated by such institutions as M.I.T. should be directed to these goals. Technology can help, he said, to counter the sense of frustration and bafflement often expressed by young people today. "It does no good to long for the old days. We cannot go back. We must find solutions, and the solutions must be in broader applications of engineering, social science, and effective management."

More than 200 M.I.T. Alumni, wives, guests, prospective freshmen and their parents attended the meeting, held at the Engineers Club. Paul P. Shepherd, '55, Club President and western vice-president of Cabot, Cabot & Forbes, presided. Also at the meeting five high school students from Northern California were announced as winners of M.I.T. National Scholar awards. The five are among 145 prospective freshmen nationwide who have been honored for outstanding academic and personal achievement in secondary schools.

Denman K. McNear, '48, vice-president of the Southern Pacific Company who is chairman of the M.I.T. Educational Council for northern California, announced that 22 high school seniors in this area have been admitted to the M.I.T. entering freshman class.

Mr. Johnson told the dinner meeting that in a society characterized by interdependence and diversity, many major problems confronting humanity today are themselves the result of technological advancement. "We are beginning to discover that the right of free citizens to move freely without hindrance can be made meaningless by the breakdown of mass transportation. The right of free assembly can be negated by impassable city traffic, or, for that matter, uncontrolled crime in the city streets. We are beginning to suspect that free speech and free press might become irrelevant if we are slowly strangled by the air we breathe or slowly poisoned by our drinking water. We are beginning to see that equal rights and equal job opportunity, when finally obtained by citizens long denied them, can be made meaningless by intolerable housing conditions or by ineffective education systems. We are beginning to realize that if exploding populations create a world of starving humans almost standing on each other's shoulders, all concepts of freedom can become irrelevant, and American prosperity could be infuriating and incendiary to billions deprived of either hope or future."

The 'new technology,' President Johnson said, must be based on the employment of modern technological means in the solution of large-scale and growing human problems. "In addition to being concerned with every man, technology must also be concerned with the whole man. It must seek to create the large-scale environment in which man can realize his full potential as a human being. It must be as sensitive to aesthetics as to efficiency, to human growth as to economic and industrial expansion."

M.I.T. Club of Buffalo and Niagara Falls: The Human Use of Technology

"The time has come for the American people to demand that the miraculous instrument of television becomes a civilized voice serving a civilized community," James R. Killian, Jr., '26, Chairman of the Corporation of M.I.T., told over 500 Alumni, business leaders and educators from throughout western New York state at the spring meeting of the M.I.T. Club of Buffalo and Niagara Falls. It was by far the largest meeting and the most ambitious activity ever undertaken by the Buffalo club. Dr. Killian referred to television as but one example of sophisticated modern technology which should be better used by the American people for the great purposes of which they are capable.

Computers, information transfer systems, the techniques of systems analysis, and the new institutional arrangements these methods require are other aspects of modern science and technology that must be used to keep American education moving ahead, Dr. Killian said. "The great challenge is to control these technological resources for the best purposes of education and not let the technological tail wag the educational dog. I have become allergic to much of the talk about the dehumanizing effects of technology. It is not the technology which dehumanizes; it is our crass and inhuman use of it. The universities have a great responsibility to master those uses of technology which provide powerful and humane aid to the learning process."

Dr. Killian was science adviser to former President Eisenhower and played a key role in organizing national missile and space programs. More recently he headed a Carnegie Commission study that recommended "Public Television," an ambitious system of noncommercial television for the country. "If television is to become widely effective," Dr. Killian declared in referring to his recent assignment as chairman of a Carnegie Corporation panel on television, "the scholar and the teacher must join forces in discovering ways in which it can best contribute to the educational process."

"It needs the kind of creative attention on the part of scholars and teachers that produced the new approaches to the teaching of physics, mathematics, and other sciences, and so far it hasn't had it—except now and then."

"Proposals are now before the Congress to establish a national system of public television to realize the great potential of this superb instrument and to bring to all our people its power to educate, to inform, to entertain, and to delight. These proposals warrant the support of all who wish to enrich the quality of our society."

"Public television can be powerfully educational, even when it is not presenting formal instruction. Public television programs should carry the best of knowledge and wisdom directly into the home. Great teachers should have opportunities to interpret the new math, the new physics, the new social sciences through home television. Some of the best educational films of the past decade were made as teaching aids to new curricula. They should be adapted to television."

"The unique opportunity is to bring before those who seek to understand, those who understand deeply. Public television should give each home the opportunity to be a center for learning, where knowledge and scholarship are informally and expertly available. Public television has already demonstrated its capacity to be responsive to the people's hunger for knowledge and self-improvement, but it is only at the threshold of what might be done."

"The academic community has a responsibility to contribute its insights and sense of the first-rate to making public television a great educational resource for America. So far our universities, in the main, have let television down and in doing so they have missed a great educational opportunity."

As an example of masterful uses of educational television, Dr. Killian cited Japan's non-commercial system, which he called the best such system in the world. In American Samoa, television has been the principal instrument of an education-

al revolution. We in the United States lag behind these shining demonstrations of the educational power of television, he said, though he admitted that technological innovation and invention already have helped improve teaching in our schools. But "there are still some startling inadequacies in existing technology which we educators have timidly accepted," Dr. Killian said, and he cited the technology of projecting sound movies as an example.

"For years there has been need, especially in the lower schools, for a simple, inexpensive 'school-proof' movie projector with sound. Nothing fully meeting these specifications is yet available. We have built space vehicles and photographed the moon, but we still haven't built an inexpensive school-proof projector."

Dr. Killian said universities must lead in initiating experiments to find "the pedagogical and humanistic innovations which will enable us to make the best use of technological innovations." The task is very large, however, and requires the over-all multidisciplinary approach of systems analysis and engineering which has been applied so effectively in space and defense by the national laboratories and non-profit research corporations. Community health and urban affairs are examples of opportunities for a systems approach.

"New kinds of institutions may be necessary to permit the appropriate participation of university scholars in such systems efforts without encumbering the university with tasks inappropriate for an educational institution," he said.

New institutional arrangements could draw upon universities in applying modern technology to educational reform and, at the same time, protect the university's traditional role as a community of free and objective scholars, Dr. Killian said.

"It is of the greatest importance that the universities protect this freedom and objectivity and that they not compromise it by entering into any kind of relationship, whether it be with industry, government, or other institution, that makes it





PHOTOS: PHOTOTECH STUDIOS

More than 400 Alumni and their guests came to hear James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, at the spring meeting of the M.I.T. Club of Buffalo and Niagara Falls on April 10. Principals gathered before dinner for the picture, above: in front, William H. Latham, '26, of Niagara Falls, Dr. Killian, and Charles Diebold III, '58, Chairman for the evening; and standing: Alan Storms, '58, President of the Club, Matthew N. Hayes, '36, of Buffalo, Sanford M. Nobel, '58, of Buffalo, and Warren Miller, '45, Treasurer of the Club. Earlier (left), Mr. Diebold had met Dr. Killian at the Buffalo airport, where Dr. Killian conducted a brief press conference; and later he was awarded a key to the City of Buffalo by George Wyatt, representing Buffalo's Mayor Frank Sedita.

difficult for their faculties to be independent in judgment and unfettered in scholarship.

"This will not be easy, but we shall never forget that a great body of scholars—uncommitted, independent, and scrupulously objective—is the best insurance that scholarship will have unimpeachable integrity and that there will be no abuses of the profound public responsibilities scholars are increasingly called upon to assume."

The chairman of the highly successful event was Charles Diebold, III, '58, President of the Western Savings Bank of Buffalo. The M.I.T. Club of Buffalo President Alan D. Storms, '58, and a large committee of Buffalo Alumni assisted with the arrangements.

Earlier in the day Dr. Killian spoke informally to more than 80 Buffalo Alumni and other civic leaders at a luncheon at the Buffalo Club, where he described the growing interrelationships between universities and the communities around them for economic and industrial development. He spoke in detail of developments in the Boston area influenced by M.I.T. and other Greater Boston universities, and he said that similar "spin-offs" from university research and development are occurring around the academic centers in Los Angeles and Princeton.

M.I.T. Club of Rhode Island:

Nation's Economy and Lively Discussion

A highly successful dinner meeting was held at the Colony Motor Inn on Thursday, April 20. The cocktail hour which preceded the dinner allowed the 60 members, wives and guests to mingle and get better acquainted with new faces as well as renew old friendships. Professor Robert Solow, renowned economist from M.I.T., gave an informative talk on the nation's economy which led to lively discussions later on. Royal Sterling, '23, was the recipient of the coveted door prize.—Stewart A. Phillips, Secretary-Treasurer.

M.I.T. Club of Boston:

A President and Correspondent at Dinners

President and Mrs. Howard W. Johnson were honored by 275 alumni and wives at a dinner on April 13. The alumni response to this event exceeded the capacity of the Faculty Club, and over 80 additional requests for reservations had to be returned. Following the dinner Mr. Johnson described many of the activities now tak-

ing place at the Institute. Basic programs in the sciences and engineering have been supplemented with an understanding of how this knowledge can be related to the needs of society. He also spoke of the international respect for the "M.I.T. mind" and the desire to continue this development.

The Boston Club held its final meeting of the year on May 11 at the Union Oyster House to hear Mr. James N. Goodsell, Latin America correspondent to the *Christian Science Monitor*.

M.I.T. Club of Dallas:

Computer Systems and Management's Role

"How to Live With Your Computer," a seminar co-sponsored by the M.I.T. Club of Dallas, was held April 25 and 26 at the Marriott Motor Hotel there. It presented a staff consisting of several of the leading data processing experts in the North Texas area and provided management and technical planning information on the proper application of digital computer systems. It represents an expansion and improvement of an earlier program sponsored by the M.I.T. Club of New York City in 1965. Invitations were extended to executive personnel of business, industry, and educational institutions in the Southwest as well as to M.I.T. alumni.—R. L. Lichten, President

Indiana Association of M.I.T.:

Gems For Jewelry and Lasers

Athenum Turners was the scene of our March dinner meeting at which our president, Homer Fay '53, gave us the story of "Crystals for Jewels and Joules." Homer is a physicist with Union Carbide which produces rubies and sapphires for gems and more recently for the lasers we have been reading about. The alumni in attendance were: Adams, '34; Babbitt, '17; de Raimés, Robert '37; Dritsas, '25; Harvey '28; Keig, '66; Travers, '23; Wyland, '42.

Indianapolis has an engineer's luncheon club called the Sciencetech Club which was founded in 1918. One of the founding members was J. Loyd Wayne, 3d, '96. Through the years there have always been some M.I.T. alumni in the membership, but now we have an M.I.T. administration with Sam Hopper, '33, as president, and John Babbitt, '17, as vice-president. The year has been a good one and promises to continue this way.—Thomas G. Harvey, '28, Secretary-treasurer

Association of M.I.T. Alumnae:

Brainy but not Dull

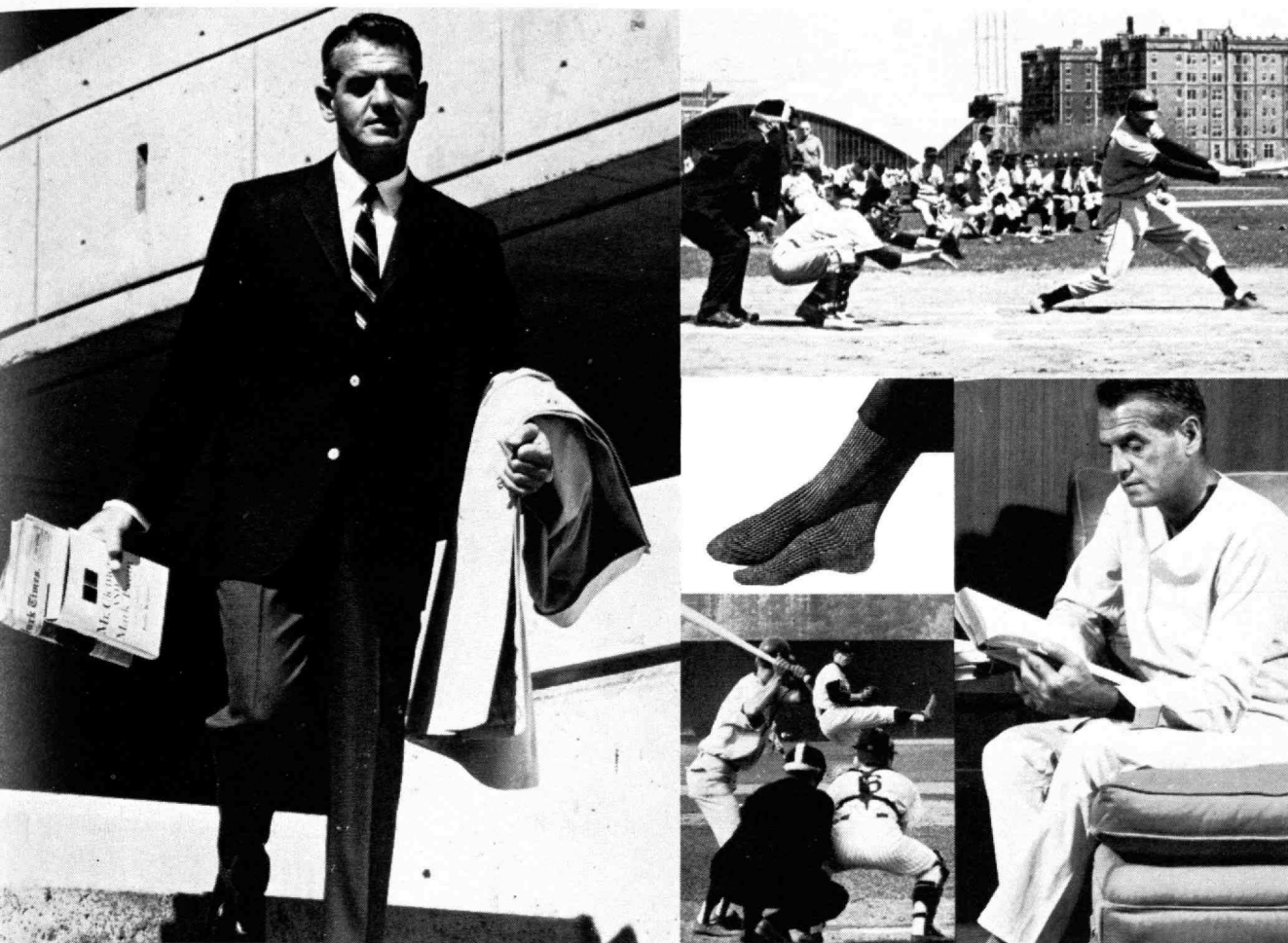
The \$100 award of the Association of M.I.T. Alumnae to the outstanding junior-class co-ed at M.I.T. was given to Karla Hurst, '68, during a February 13 meeting at the M.I.T. Faculty Club. Miss Hurst, who comes to M.I.T. from Middleburg Heights, Ohio, will be next year's president of McCormick Hall. Speaking at the dinner at which the undergraduate and graduate women students were the Association's guests, Howard W. Johnson, M.I.T. President, spoke of the broadening of M.I.T.'s educational programs; each aspect of study—science, history, art, or engineering—serves to make the others more comprehensible and comprehensive, he said, and every effort at M.I.T. is being made "to open all doors." With scientific objectivity, he also cited the extraordinary proportion of the graduating co-eds who are married or engaged to M.I.T. men, which suggests that the men are indeed brainy, the co-eds far from dull. (*McCall's* magazine has reported college students' consensus that M.I.T. draws the brainiest students, but M.I.T. men make the dullest dates.)

South Africa:

A Club in Gestation?

Oscar H. Horovitz, '22, makes the following report of a visit to Pretoria, South Africa, during a mid-winter around-the-world trip: "We had a very successful evening with a dinner meeting arranged by Dr. Jacob Zawels, '52. As we were leaving the hotel two of the men expressed regrets that they had not asked to have my film of M.I.T.'s inauguration shown twice. The following attended the dinner: Dr. Pieter F. S. Bodenstein, '62, Dr. Otto W. H. O. Brune, '28, Andrew J. Dickson, '66, Samuel Kopinsky, '49, Peter A. Laxen, '51, Dr. Gideon P. R. Von Willich, '55; Dr. Austin Whillier, '53, Dr. D. G. Kroger, '66, and Dr. Jacob Zawels, '52.

"If a South African club is ever formed it will only be done if Jacob Zawels takes the lead in forming it. These men agreed that regular meetings once or twice a year were very desirable and would be enjoyable. In South Africa, as in all the other foreign countries I have visited, there is great lethargy in regard to M.I.T. clubs. Only when a distinguished personality comes to town do they bestir themselves to attend a meeting."

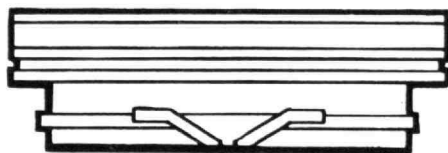


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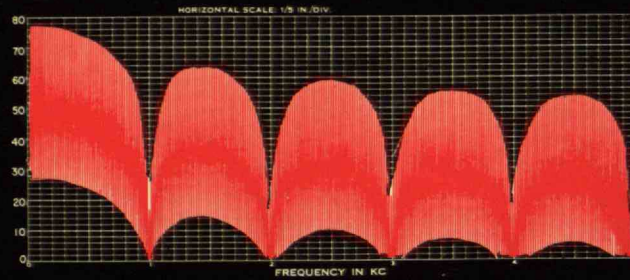
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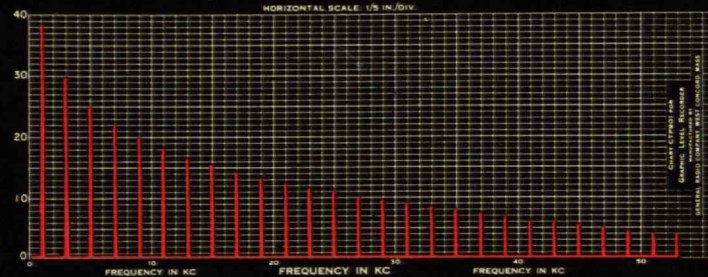
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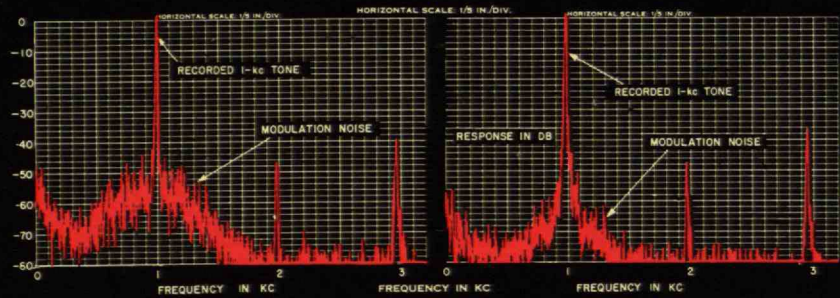
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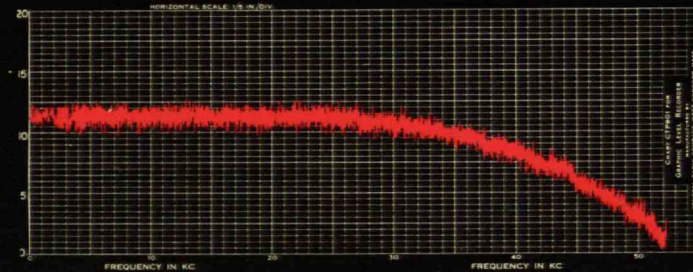
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